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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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The Model 875 is at the top of the Cyber 170 Series 800 line.

New Line of CPUs Replaces CDC's Cyber 170 Series 700

By Tim Scannell
CW Staff

MINNEAPOLIS — Control Data Corp. last week replaced its Cyber 170 Series 700 computers with a family of large-scale general-purpose processors that it said features up to eight times more memory and requires less power than the previous models.

The Cyber 170 Series 800 consists of five systems, one of which has 64K-bit memory chips and is reportedly the first Cyber 170 to be cooled by air instead of water or Freon.

At the same time, CDC announced:

• An enhanced operating system for its new and older processors and a Series 800 version of CDC's Plato education system (story on Page 6).

• An expandable cache memory feature that is standard on two of the new processors.

• A series of peripherals, including a high-capacity disk subsystem (story on Page 6).

The Cyber 170 Series 800 consists of five models: the 825, 835, 855, 865 and 875. All of the systems feature a 60-bit word structure and were designed for interactive, remote batch and transaction processing as well as commercial and scientific data base management, a spokeswoman said.

The systems are software-compatible with the Cyber 170 Series 700 machines, which made their debut more than a decade ago. The Series 700 — which consists of the Models 720, 730, 740, 750 and 760 — is now available only under the firm's resale policy, which allows formerly leased machines to be remarketed to customers.

The entry-level Series 800 Model 825 features 64K-bit memory chip technology and is an air-cooled, microcoded central processor capable of supporting up to 1M words of main memory. Its central processor is a high-speed arithmetic unit that communicates only with central memory.

The central memory is composed of two or four logically independent

(Continued on Page 6)

And Solid-State Buffer Storage

Cray Adds Multiprocessor Array Processor

By Tom Henkel
CW Staff

MENDOTA HEIGHTS, Minn. — Cray Research, Inc. last week brought out a multiprocessor version of its Cray-1 S series of scientific array processors which are used mainly in statistical research and large-scale simulation applications. At the same time, the firm announced a solid-state buffer storage unit for the Cray-1 S and multiprocessor CPUs.

The newly introduced Cray X-MP offers about five times the throughput of the S/1000 at a 15% higher price tag. The multiprocessor consists of two central processors that look like S series units but include architectural enhancements that give the individual processors a faster throughput than the older S series processor, the vendor said.

The main enhancement is an expansion of the CPU memory bandwidth from one to four ports. On S series processors, the CPU is capable of performing one read, write or I/O operation at a time. By expanding the bandwidth to four ports, the X-MP processors can handle two read operations, one write and one I/O operation at the same time, Cray said.

Each of the processors in the X-MP complex has an internal clock time of 9.5 nsec, compared with 12 nsec on the S series processor, a spokesman noted.

The two X-MP processors share a common main memory and storage registers, which allow each processor to execute concurrently different

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TI Promises Extermination of Dnos Bugs

By Bruce Hoard
CW Staff

ORLANDO, Fla. — Texas Instruments, Inc. has admitted there are problems with the initial release of its Distributed Network Operating System (Dnos), but promises relief is on the way.

"We believe there are deficiencies in the first release that will be dramatically improved in the second release," TI's OEM marketing manager, Kenneth Wickham, said last week.

Those "deficiencies" are costing the Orlando branch of the Florida Crime Information Center $1,200 a day, according to Bob Smallback, director of Criminal Justice Information Systems. He said he is incurring those expenses because the Dnos running on the system he bought from an OEM firm is unable to support his terminals, forcing him to offload processing to the Orange County data center.

Smallback was told Dnos Version 1 would support up to 99 terminals; however, it crashes "a couple of times a day, anyway" while failing to support the 40 terminals that are currently attached, he said.

The crashes occur when the system attempts to complete processing after failing to check whether enough resources are available, he maintained. According to Smallback, the system also goes down when more terminals are added or everybody tries to log on simultaneously.

"The whole system begins to talk to itself," he said. "Then it goes into massive loops until every terminal is locked out."

The Florida Crime Information Center received Dnos as part of a twin TI 990 Model 30-based system purchased from Daxko of America, Inc. Daxko President Randy Ray said his company was a Dnos beta test site and successfully ran up to 36 terminals.

Some bugs should be expected from every new operating system, Ray

(Continued on Page 6)

Guilty Verdict For Burroughs In B800 Case

By Tim Scannell
CW Staff

TWIN FALLS, Idaho — Burroughs Corp. has been found guilty of misrepresentation in a case involving one of the first users of its B800 computer system.

In a unanimous verdict, a district court jury ruled in favor of Century Automotive Machines, a motorcycle dealership and machine shop here that filed suit against the computer vendor more than three years ago. Burroughs has been ordered to pay $47,200 — "the difference in value between what a promised B800 should have been and what it actually turned out to be," Thomas L. Stephan, the plaintiff's counsel, explained.

Burroughs does not intend to ap-

(Continued on Page 8)

Judge Rules Personal Use of Employer's Computer Legal

By Bob Johnson
CW New York Bureau

NEW YORK — A person who is authorized to access his employer's computer and uses it for personal endeavors is not in violation of the law.

So ruled a Brooklyn criminal court judge last month as he dismissed theft of services charges against a New York City Board of Education systems programmer who had allegedly stored data relating to racehorse breeding on the school system's computers.

Judge Michael R. Juviler granted defendant Thomas Weg's request for dismissal of the case based on the fact that whatever Weg might or might not have done, he had not broken the law because he had legitimate access to the Board of Education computer system. It would have been a different matter if Weg had been "plugged into a computer that was being leased to the public and he was simply trying to avoid payment," the judge stated.

"It was not the intent of the legislature to forbid unauthorized internal use of equipment, but rather unauthorized use of equipment in a commercial setting where the equipment or service is being leased for hire."

The school system had not enacted any rules specifically prohibiting personal use of the computer system.

Weg, an employee of the Board of Education for 17 years, was arrested last July when a member of the board's Auditor General

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COMPUTERWORLD
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Conference Set for June 7-10

Houston Starts NCC Countdown

HOUSTON — The city that bills itself "Space City U.S.A." will turn into "Computer City U.S.A." when the National Computer Conference hits town June 7-10.

With three keynoters, 80 technical sessions and a product exhibition that will fill 320,000 square feet of space in Houston's famous Astrodomain, NCC '82 will focus on the theme of "Advancing Professionalism." The sponsor of the show, the American Federation of Information Processing Societies, Inc. (Afips), is expecting up to 80,000 attendees during the four days of the conference.

This year's keynoters will include James E. Olson, vice-chairman of the board and a director of AT&T, who will speak on Monday, and Theodore A. Burtis, chairman of the board and chief executive officer of the Sun Co., who will speak on Tuesday. Wednesday's keynoter will be Gordon Morrison, an assistant postmaster general.

This year's NCC will feature:

• *Eighty technical sessions.* These sessions will be divided into nine tracks — hardware/computer architecture, software engineering, personal computing, social and organizational implications, office systems, management issues/decision support systems, language and data base processing, applications of computing and Pioneer Day, which will celebrate the 25th anniversary of the first Fortran compiler.

• *Nine Professional Development Seminars.* Representing "a conference within the conference," these half- and full-day seminars will concentrate on five curricula: computer graphics, communications/data security, data management, current issues and new technology and a general category. The seminars will be held at the Shamrock Hilton Hotel, a short distance from the Astrodomain.

• *Product exhibits by more than 650 vendors.* Although Afips originally anticipated filling 256,800 square feet in the Astrohall with exhibitors' booths, the demand was so great that exhibits will also be featured in the Astroarena.

• *A film forum.* Among the presentations will be Polaroid Corp.'s 1982 production of "Graphic Harmony" on color graphics and the National Aeronautics and Space Administration's "Space Research and Health."

The Harry Goode Memorial Award, which Afips established in 1964 "to honor and encourage outstanding contributions to the information processing field," will be presented at the Wednesday plenary session. Last year's winner was Prof. Charles Anthony Richard Hoare; Afips is still mum on this year's winner.

For those NCC attendees who like to step out a bit, Afips is offering four tours — a night tour to Gilley's, the "Texas honky-tonk" featured in the movie *Urban Cowboy*; a visit to the LBJ Manned Spacecraft Center; a tour of Houston; and a tour of Galveston. The cost of the tours range from $9 to $15 per person.

Foreign visitors to NCC — Afips expects 5,000 — will be greeted by the organization with an International Visitors' Lounge, an international currency exchange, a "friend-finder" minicomputer, a message center and an interpreter.

Special services for people with physical handicaps will be provided at the conference. Arrangements should be made ahead of time with Kerry Baer, who can be reached at IBM, 16th Floor, 2 Riverway, Houston, Texas 77056.

The fee for attending NCC '82 is $90 for the four days of technical sessions and the exhibition. The cost of admission to the exhibit floor only for the four days is $30. The Professional Development Seminars cost $30 for a half-day session and $60 for the full day.

Admission to NCC is also available on a daily basis: $25 per day for the program and exhibits and $10 per day for the exhibits only.

A conference kit with registration forms, housing forms and transportation information can be obtained by writing NCC '82 Registration, Afips, P.O. Box 9658, Arlington, Va. 22209.

If You Can Get There Early. . .

HOUSTON — If you can get here the day before the National Computer Conference officially opens, you can:

• Beat the crowds and register early (from 2 p.m. to 6 p.m.).

• Attend a special presentation called "The Profitability of Career Planning." Given from 1 p.m. to 5 p.m. by Herbert B. Safford of GTE Data Services, Inc. for people interested in a future in computers, the presentation will be made up of two seminars running concurrently: "Plotting Your Computer Career — Business Major" and "Plotting Your Computer Career — Engineering Major."

Four speakers at each seminar will discuss educational curricula, career objectives, the transition from student to employee, resumes, interviews, selecting the right company, accepting/rejecting salary offers, understanding the work environment and identifying career development opportunities.

• Celebrate the opening of NCC '82 at an Early Bird Reception that will be held from 4 p.m. to 6 p.m. in the Astrohall. The conference's sponsor promises "a Texas-style welcome with genuine Texas music, lots of wine and beer and hearty refreshments."

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GIANTS

46 of America's 50 largest firms now use SyncSort.

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THE FORTUNE 50–1981

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	Westinghouse Electric
Standard Oil (Ind.)	R. J. Reynolds Industries
General Electric	Goodyear Tire & Rubber
Atlantic Richfield	Beatrice Foods
Shell Oil	Xerox
International Tel. & Tel.	Marathon Oil
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Phillips Petroleum	LTV
Tenneco	Amerada Hess
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(3) THE BEST CUSTOMER SERVICE. Our Technical Service people are sorting experts. They play a key role in the shaping of new releases of SyncSort. And they provide fast and accurate service when required. About 85% of all requests for advice or assistance are resolved within 24 hours.

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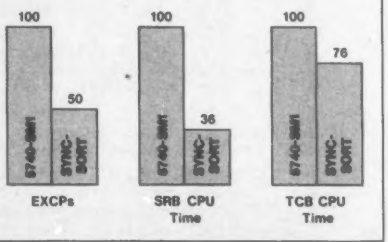
SyncSort OS Rel. 2.4 vs. BLOCKSET IBM's 5740-SM1, Rel.5



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Results of First Formal Study

Users Found Suffering 'Network Addiction'

By Marguerite Zientara
CW Staff

NEWARK, N.J. — The first formal study on the effects of a communications network on its users has found 20% of 500 scientific network users addicted to their electronic message systems.

The network studied was the Electronic Information Exchange System (Eies, pronounced eyes), which has been operational at the New Jersey Institute of Technology (NJIT) since 1976. Enjoying National Science Foundation sponsorship until April 1980, the network is dedicated to the evaluation of communications technology and links scientific users throughout North America and Europe.

Addiction occurs when one becomes "dependent upon the system as a means of doing one's work or communicating, such that if the system is down or your terminal is broken, you feel somewhat helpless and frustrated as if you can't even work," explained Starr Roxanne Hiltz, professor of sociology at Upsala College in East Orange, N.J.

"A typical quote from what I would call an addicted user was, 'I can't think when the system is down,'" Hiltz said. "They get so used to using [the system] to support their writing and communication that they feel ineffectual when they try to use typewriters and telephones instead."

Other Evidence

Other evidence of addiction is when a user engages in play as well as work on the system. "It's something like when you start looking forward to going into the office because you've made friends there and it's become a social occasion," Hiltz said. The electronic games played are analogous to coffee breaks and the celebration of birthdays in an office, she added. In addition, addicts "begin inventing new language uses that don't exist in standard English," Hiltz pointed out. "For example, in 'I will message you,' 'message' becomes a verb.

"Addicts actually begin to think in computer metaphors, and it creeps into their language," she noted. "'I've got to clear my buffer' can be another way of saying, 'I've got to think things through.'

"We never found an ex-addict," Hiltz noted. "After two years they had to pay for using Eies, but they always found some way to stay on-line. Some addicts quit their regular jobs and sold services on the computer; some sold their second car to buy a micro."

During the two-year study, many addicts willingly discussed their experience of network addiction. "For example, people who get addicted to this technology say they tend to get psychologically upset at anyone phoning them, even though they rationally know the person's not on the system and has no other way of reaching them," said Murray Turoff, NJIT professor of computer and information science and the designer of Eies. "The idea that the phone call interrupts what they're doing — as opposed to when the addict goes to the terminal and makes all the decisions about whom he wants to talk to when — makes the telephone a very obnoxious device to the addict."

In fact, addicts "get annoyed at people who phone them even when they're not at the terminal," Turoff noted, "because they'd much rather those people just left a written message for them on the system."

Are certain personality types more likely than others to become addicted to a communications network? A personality test is about to be administered in an effort to answer that question, Hiltz indicated.

Nevertheless, Hiltz has some "suspicions but no data." Addicts are likely to have a high need for dominance and control in their lives, be self-activating and demonstrate general innovativeness, acceptance of change and a lack of conservatism.

And will communications networks eventually have a profound impact on social interaction? "We've seen that the patterns of communication between on-line and face-to-face interactions are very different," Turoff said.

Study Conducted by Tracking Seven Task Groups for Two Years

NEWARK, N.J. — To study the effects of communications networks on users, the New Jersey Institute of Technology (NJIT) tracked seven task groups for two years, both electronically and through surveys.

The seven task groups — sponsored by the National Science Foundation and dedicated to scientific research projects — were surveyed before they started using the Electronic Information Exchange System (Eies) network, three months after they began using the system and then were surveyed again 15 months later.

The Eies network — which is tied to GTE Telenet Communications Corp.'s Telenet and Uninet, Inc.'s Uninet networks — consists of four major components: a message service, a conference service, personal notebooks and text editing.

Electronic monitoring was done with the knowledge of the participants, explained Murray Turoff, NJIT professor of computer and information science and the designer of the Eies system. "They knew what we were monitoring," he said. "We were not monitoring what they were saying, but rather how many messages they wrote, whom they messaged, how many messages they received, how much time they spent on-line and what functions they used on-line.

"We [got] a good idea of their traffic. We found that whereas people came in different groups, there was an awful lot of what we call 'electronic migration,' people forming ad hoc groups on various topics that weren't part of their original interest," he said.

The researchers also found that besides the 20% who became addicted to Eies, about 40% of those who joined the network became regular participants and the other 40% dropped out. Of those who dropped out, some complained that their terminal was not close enough to their desks; others said there were not enough interesting people to "talk" to.

All monitoring was done by computer, Turoff explained. Eies is based on a dedicated Perkin-Elmer Corp. Interdata 3230 with 2M bytes of core memory and 1.2G bytes of disk.

Corrections

"Report Generator Subsystem Introduced for Dialog's 'Plato'" [CW, April 5] referred to the vendor of the subsystem, OR/MS Dialogue, Inc., as Dialog, Inc. OR/MS Dialogue's report generator subsystem was designed for its Plato Decision Support System software, which will run on most mainframes and minicomputers. OR/MS Dialogue, Inc. is located at 19 Rector St., 35th Floor, New York, N.Y. 10006.

"'Info' Available for PDP-11s" [CW, April 12] should have noted that Henco, Inc.'s Info-Interface to Muse — a word processing package from Marc Software International, Inc. — is available on Prime Computer, Inc. systems; Digital Equipment Corp. VAX-11 and PDP-11 systems; Honeywell, Inc. DPS 6; Harris Corp. equipment; and IBM mainframes running under VM/CMS.

In "Azrex Offers Updated Version of 'AZ7' Report Writer Package" [CW, April 12], it was mistakenly reported that the AZ7 can be used "with standard time-sharing subsystems, including Honeywell, Inc.'s Gcos/TSS, which runs on Honeywell's Level 6 system." The system on which Gcos/TSS runs is the Honeywell Level 66.

In "Manufacturers Using HP CPUs Get Software" [CW, April 19], Professional Business Industries, Inc.'s Order Entry III was described as "designed to provide more power to HP's MM-300 and PM-3000 systems, which are currently marketed with the HP 300 processor line." This sentence should have referred to the MM-3000 and HP 3000, not the MM-300 and HP 300.

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The charts below only tell a small part of the story.

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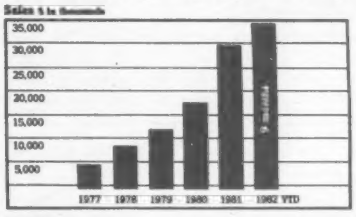
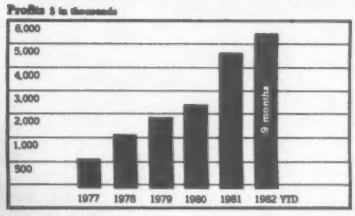
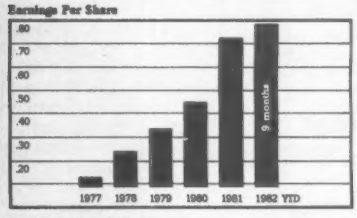


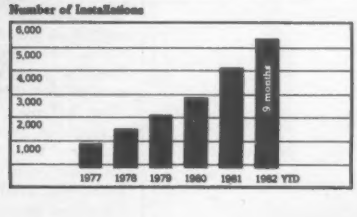
Profits $ in thousands



Earnings Per Share



Number of Installations



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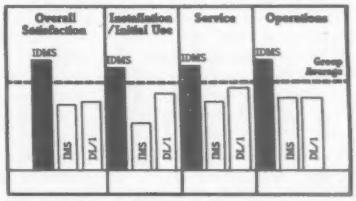

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Cullinane Database Systems, Inc.,

CDC Unwraps Replacement For Series 700

(Continued from Page 1)

banks, each with a read/write cycle time of 400 nsec. The central memory also has two interface ports, a data distributor that provides services to each port on a priority basis and error-correcting code generators, the spokeswoman noted.

Like previous systems in the Cyber 170 line, the Model 825 has an I/O unit consisting of 10 Peripheral Processors Units and 12 data channels that operate independently as stored program computers. The I/O unit also has a Maintenance Control Unit for system initialization and a Remote Technical Assistance line interface that allows remote maintenance by CDC technicians, according to the spokeswoman.

The Model 835 is a 16K-bit memory system said to be three times as powerful as the entry-level 825. It differs from the 825 in that it is a liquid-cooled machine and can support up to 2M words of main memory.

While the 835 has a slower read/write cycle time than the 64K-bit Model 825 — about 448 nsec per memory bank — it has cache memory as standard equipment. The built-in cache is expandable from 2K to 4K words.

The 835 offers up to eight independent memory banks that minimize memory access conflicts, the spokeswoman noted.

The Model 855 is about seven times as powerful as the entry-level Model 825. Like the 835, it uses 16K-bit memory chips and has up to 2M words of main memory.

Featuring multiple-operation modes in all of its processing segments that reportedly allow the system a high overall computing speed, the Model 865 offers extended memory capabilities that are available via a Unified Extended Memory (UEM) or external Extended Semiconductor Memory (ESM). The UEM allows central memory to be spread out into areas normally reserved for execution and large data storage, while the external ESM allows data transfer rates up to 10M word/sec, the spokeswoman said.

With ESM the computer can also be supplemented with a Direct Extended Memory Access option that lets users attach CDC's recently unveiled Model 885-42 high-capacity disk subsystem.

With its integral high-speed I/O subsystem, the 865 is up to 1.5 times as powerful as the Model 855, the spokeswoman claimed.

Finally, the top-of-the-line Model 875 features 16 memory banks of 4K-bit bipolar memory chips which are said to provide a read/write cycle time of 75 nsec per bank. The system is capable of supporting up to 1M words of memory and can optionally handle a second CPU.

Like the 865, the Model 875 has extended memory capabilities via UEM and ESM. Both the Model 865 and Model 875 can support an optional second processor that boosts overall systems performance, the spokeswoman noted.

The Series 800 systems operate under both CDC's multimode Network Operating System (NOS) and just-introduced NOS Version 2. Languages include Fortran, Cobol, Algol, APL, Basic, PL/I and Compass.

The Cyber 170 Series 800 computers are priced from $370,000 for the entry-level Model 825 to $4,480,000 for a dual-processor Model 875. All systems include a minimum of 10 peripheral processors, 12 channels and an operator console.

Monthly lease prices range from $8,605 to $95,000 on a three-year contract.

The Models 825 and 835 are available immediately while the 855 and 875 are scheduled for delivery in July and November, respectively. The Model 865 will begin delivery in early 1983, the spokeswoman said.

Additional information can be obtained from CDC, P.O. Box O, Minneapolis, Minn. 55440.

CDC Upgrades NOS, Adds Applications

MINNEAPOLIS — As part of the upgrade of its Cyber 170 family, Control Data Corp. last week introduced an updated version of its Network Operating System (NOS) that reportedly gives users a freer hand in creating data processing programs and procedures. The firm also announced a number of industry applications software packages for its newly announced Cyber 170 Series 800 machines.

NOS Version 2 was designed to support Series 800 computers in stand-alone situations, in multicomputer arrays or as part of data processing networks, a CDC spokeswoman claimed. The operating system is compatible with CDC's previous NOS and handles Fortran, Pascal, PL/I and other high-level languages.

The major benefit of the enhanced operating system is that it lets users choose familiar words and phrases to develop applications and programs and can initiate processing with simple commands rather than complicated system procedures and parameters, the spokeswoman claimed. NOS Version 2 also offers a "global library" that allows users to place files anywhere in the computer system and access these files at any time through a single command, she said.

Other features include a system resource unit, which is an accounting system that measures the amount of system resources needed to perform a particular job, and CDC's Remote Technical Assistance (RTA) routine, which allows technicians to maintain a user's system via a remote terminal.

The revamped NOS also supports CDC's Plato computer-based education system as a standard applications program, the spokeswoman continued. Previously, the specialized software required a separate and dedicated processor.

CDC Also Adds Disk, Terminal, Printer

MINNEAPOLIS — Rounding out its Cyber systems introduction last week, Control Data Corp. announced a high-capacity disk subsystem, a multifunction CRT terminal and a desktop matrix printer.

The Model 885-42 disk storage unit is a rotating mass storage device that has two spindles and can store up to 8.3G bytes of data. The device can be used with CDC's newly introduced Series 800 Models 865 and 875 processors as well as with the earlier Cyber 170 Series 700 machines.

The disk subsystem reportedly has an average positioning time of about 25 msec, with a data bit transfer rate of 38.3M bit/sec. It operates via the extended memory capabilities of the 865 and 875 processors via the systems' Extended Semiconductor Memory (ESM).

When ESM is added to a system, the user can optionally add Direct Extended Memory Access, which allows the attachment of the high-capacity disk system. ESM acts as an auxiliary buffer for data being transferred to and from disk storage, a CDC spokeswoman noted.

The disk subsystem costs $75,900.

The Viking Model 721 CRT terminal is reportedly capable of handling alphanumeric data entry, on-line editing and graphics applications. It features a swivel-and-tilt display, antiglare faceplate and detachable keyboard.

The microprocessor-based unit can operate in either an 80-col or 132-col mode, has selectable transmission speeds of up to 19.2K bit/sec and has an Ascii downline capability.

The Viking 721 also supports a number of operational modes, including Teletypewriter-compatible configurations, CDC's Plato and Tektronix, Inc.'s 4010 emulation. It can also access applications on CDC's Cybernet service.

The Model 721 terminal costs $2,295.

Finally, CDC unveiled a compact matrix impact printer that can bidirectionally print 96 Ascii characters in 132 col at 10 char./in. The printer has a speed of 150 char./sec and costs $2,150.

This announcement appears as a matter of record only.

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TI Promises Dnos Relief

(Continued from Page 1)

noted, adding, "TI's aware of it, we're aware of it and we're working fast and furious to solve the problem. We're a few days away from having it solved."

He believes TI added some governors to Dnos between the time Daxko finished testing it and the time it became commercially available. "The governors decreased the number of terminals you could add because they placed a restriction on what is called 'the systems table area,' " Ray declared.

TI's Wickham said the number of terminals that should run under Dnos is application-dependent, but 40 or 50 terminals is a "reasonable number." He expects to offer the beleagured Florida system relief by "tuning" it within the next three weeks. Beyond that, Dnos Version 1.1 will be out within the next 45 to 60 days, he claimed.

In this instance TI intends to tune the system by adjusting the governors that restrict the number of disk accesses outstanding at any one time. Wickham did not know if the Dnos beta tested by Daxko contained governors.

Wickham admitted some other Dnos users are experiencing problems similar to Smallback's, but "not to the same extent that we're talking about here."

Harris Adds Two Versions Of Its H800 Supermini

FORT LAUDERDALE, Fla. — Harris Corp.'s Computer Systems Division has upgraded its H800 superminicomputer by adding two processors that reportedly feature up to three times the real memory and up to four times the virtual memory of the firm's previous top-of-the-line system.

The H800-1A and H800-1B are architecturally similar to the H800, introduced three years ago, but feature two additional printed-circuit boards, a modified execution unit board and a modified cache memory board.

The two new boards are an address processor dual board and a virtual memory device that work with the modified boards to deliver up to 12M bytes of main memory and 48M bytes of virtual memory — claimed to be the most virtual memory offered on currently available superminis.

Like the H800, the recently introduced systems support up to 128 users and handle interactive program development, time-sharing, multistream batch, multiple job entry and real-time processing. They also feature 6K bytes of bipolar cache memory, an integral floating-point processor and a 48-bit architecture that allows up to seven instructions to be acted upon simultaneously, a spokeswoman said.

The H800-1A and 1B reportedly use the same languages and applications software as the H800, but operate under the firm's recently introduced Virtual Operating System (VOS) March 22], which can take advantage of the extended memory offered by the company.

A 768K-byte H800-1A costs $192,400. The H800-1B is priced at $199,600 and has about 1.5M bytes of high-density memory. Prices include a system console terminal with programmed I/O channel and a maintenance-aid processor terminal, the spokeswoman noted. Both systems will be available this August.

For current H800 users, a memory upgrade package — consisting of plug-in boards — is available for $18,800 from Harris at P.O. Box 6200, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33310.

Cray Offers Multiprocessor

(Continued from Page 1)

jobs or work simultaneously on the same job. Cray is now working on enhancements to the Cray Operating System (COS) to support the multiprocessing environment. Both concurrent and simultaneous processing features should be available by the time the first four processors are delivered in 1983, the spokesman said.

The X-MP will reportedly be software-compatible with the S series.

In addition to the multiprocessor complex, Cray announced the Solid-State Storage Device (SSD), which acts as a high-speed buffer for both Cray-1 S series and X-MP systems. The unit is available in 64M-, 128M- and 256M-byte configurations and is 50 to 100 times faster than a conventional disk transfer system for short random or long sequential data transfers, Cray said.

The SSD can be used for storing frequently used data or programs and can transfer a 1M-word data set in 50 msec. Its maximum burst transfer rate was reported at 10G bit/sec.

The X-MP processor costs $11.4 million for a 2M-word system and $14.5 million for a 4M-word system. The SSD buffer costs $1.76 million for a 64M-byte version and $3.28 million for a 256M-byte version. Delivery is scheduled for the fourth quarter.

Cray's corporate headquarters are located at 1440 Northland Drive, Mendota Heights, Minn. 55120.

Amdahl Announces 470/XA

SUNNYVALE, Calif. — Amdahl Corp. today announced an extension to the architecture of its 470V/7 and 470V/8 processors that is designed to support the functions of IBM's MVS/SP Version 2 Release 1 and data management facilities — collectively known as MVS/Extended Architecture (XA).

IBM's MVS/XA was announced late last year for its 3081 and 3083 processors [CW, Oct. 26].

Amdahl's 470/XA consists of additional processor hardware, the extension of existing 31-bit addressing logic and software that is said to include an improved version of Amdahl's MVS/System Extension Assist program product.

Support for MVS/XA provided by 470/XA includes bimodal operation, permitting concurrent execution of 24-bit and 31-bit programs, and a dynamic channel subsystem. Since the software provided with the 470/XA feature performs interpretive emulation, some performance degradation is expected, Amdahl said.

Amdahl unveiled the extended architecture feature to allow its customers to maintain compatibility with existing applications software and with MVS/XA system software, a spokesman explained.

The hardware/software feature, optionally available as a field installment, costs $250,000. Maintenance costs $250/mo.

Delivery dates will be announced at the time that IBM releases its MVS/XA software, sometime in the first quarter of 1983, Amdahl said.

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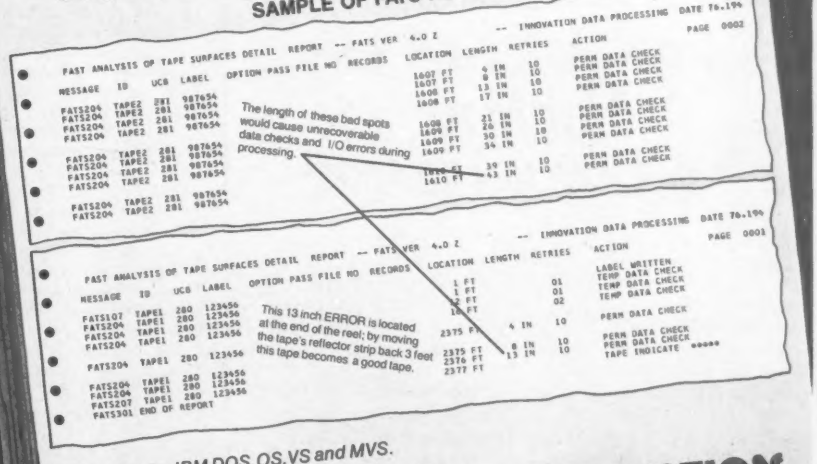

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Out-of-Date Data Helps Collar Suspect in N.Y. Killings

By Jim Bartimo
CW Staff

NEW YORK — The use and misuse of the National Crime Information Center (NCIC) data base has provided the only lead in the recent slayings here of three CBS-TV employees and a federal witness.

"The system didn't work very well this time," according to Joseph Valiquette, New York FBI agent and spokesman. Acting upon outdated information in NCIC that a suspect's van was stolen property, the FBI arrested Donald Bowers. "Some law enforcement agency . . . I think it was in New Jersey, had forgotten to take the van off the list," Valiquette said.

Bowers had been followed for 800 miles to Kentucky by FBI agents who hoped he would lead them to the killers. Bowers did not fit the description of the killer provided by eyewitnesses, but the van he was driving was believed to be the vehicle involved in the murder, Valiquette said.

Although Bowers had not stolen the van, he was arrested and flown to New York when the NCIC data base showed he was wanted for another crime. "Since he's been brought back here, he's been sentenced to 90 days. That gives the district attorney's office some breathing room," Valiquette said.

Bowers is the only suspect in the April 12 murders of three CBS television employees who were shot as they apparently attempted to aid Margaret Barbera, a federal witness in another criminal case, as she was being abducted from a rooftop parking lot on Manhattan's West Side. Barbera was found dead in a New York alley the next day with a bullet wound in the head.

"There have been reports in the news media that the Kentucky police screwed up the investigation by arresting him, but those reports are totally false," Valiquette said. "We decided we had gone far enough with him at that point and requested that the Kentucky police arrest him."

Running under IBM's OS/MVS operating system, the NCIC's National Advanced Systems Corp. NAS/5000 mainframe is accessed by "almost every" law enforcement agency in the country through remote terminals, printers or other computers, according to the Washington, D.C., manager of the FBI computer center, John Cary. When a suspect is detained by police, his name, license number or license plate number can be run against NCIC to find if they are wanted in other areas.

Burroughs Found Guilty of Misrepresentation

(Continued from Page 1)

peal the court's decision, a spokesman for the firm said last week. Century Automotive, however, does intend to appeal at least one aspect of the case — the judge's decision not to allow the jury to consider the firm's charges of fraud or to decide on any punitive damages.

Century Automotive filed suit against Burroughs in 1978, alleging that a B800 system it bought a year earlier never performed as promised [CW, Jan. 19, 1981].

Century Automotive was reportedly one of the first users of the B800 computer and is believed to be one of the first to file suit against the machine's vendor.

Salesman Testifies

Central to the suit and the recent jury decision was a deposition and later testimony given by a former Burroughs salesman who sold the system to the firm. During the trial, Burke Vanderhoef — who had been nominated Salesman of the Year for two years in a row before leaving Burroughs in 1980 — testified that he had been told by his superiors how to represent the B800 system to customers.

At the time, Vanderhoef believed these representations to be true; however, he later learned that they were false, Stephan claimed.

Also important to Century Automotive's suit was a series of allegedly incriminating internal Burroughs documents that surfaced during pretrial discovery.

Although boxloads of documents were delivered to Century Automotive's lawyers at the court's request, only a handful were presented at the trial, Stephan claimed. One reportedly concerned a critical deficiency in the B800's system software.

When Century Automotive filed its suit against Burroughs, it charged the vendor with fraud and breach of contract as well as misrepresentation and asked for at least $835,000 in damages, plus compensatory fees. However, the court awarded Century Automotive only about 5% of that amount — barely enough to cover the firm's legal fees.

Midway through the trial, Judge Daniel Meehl dismissed Century Automotive's claims of fraud and refused to let the jury decide on any punitive damages. The judge reportedly reasoned that the firm's charge of fraud did not have all the elements necessary to prove fraud under Idaho law.

'Willful Ignorance'

"One of the elements is that the speaker either knows the statement is false or is ignorant of its truth," Stephan explained. "Well, Judge Meehl has applied the additional standard that it has to be a 'willful ignorance' — the speaker has to know that he is ignorant of what he is saying."

Stephan felt that because Burroughs has the ability to test its computer equipment, the vendor "either tested it and they knew that the thing wouldn't work, or they didn't test it, so they knew they were ignorant."

Peter Vogel, a Texas attorney and computer expert who is a member of Century Automotive's legal team, agrees with Stephan's interpretation of Meehl's actions.

"We feel that we are on very strong grounds to get a reversal as to the decision about fraud," he said, "but we don't know how long it's going to take. This is just one battle in a long stream of events," Vogel said.

Burroughs appeared elated with the judge's mid-trial ruling. "We obviously think the judge made the right decision," the Burroughs spokesman said.

"He ruled out fraud and he ruled out punitive damages and ended up suggesting that there was a misunderstanding. It's obviously not a major victory for them," according to the spokesman.

N.Y. Judge Dismisses Weg Case

(Continued from Page 1)

Office told the New York City Department of Investigation's (DOI) Computer Security Unit of suspicions that Weg was misusing his employer's computer [CW, July 13].

Weg, who is also a licensed groom and racehorse owner, was allegedly creating programs that enabled him to trace the genealogies of mares and sires through seven generations.

It was also suspected that Weg was using the system for mailing lists and for his resumes, according to the DOI.

DOI investigators reportedly discovered a series of programs containing entries from a Yonkers, N.Y., raceway with a "weighted table that created a number for each race horse." The entries appeared to be part of a waging system, the DOI said, but noted that there was nothing to suggest that Weg had actually done any betting.

Commenting on the outcome of the case, Juviler said that with the proliferation of computers, word processors and other electronic equipment, the New York State Legislature might want to address regulations governing a broad array of abuses that have become possible. "It might be that this is a special type of equipment so subject to misuse that the legislature might wish to protect owners of that equipment," he said.

Weg's attorney, Lawrence Feitell, argued that Weg should never have been arrested. The attorney claimed that his client was "set up" by an envious colleague at the Board of Education who wanted Weg to lose his position.

"Ted is a brilliant and capable guy who saved the city millions with his programming skills," Feitell maintained.

Noting that there were no published edicts at the Board of Education that prohibited the use of the computer for personal work, the attorney applauded Juviler's decision to drop the case.

However, Feitell took issue with the way the matter was handled. He said that it should have been treated as an administrative matter within the Board of Education rather than treated as a crime. Feitell noted that the Brooklyn District Attorney's Office offered to dismiss the case before it went to court. However, Weg decided to go to court because he wanted a decision that would wipe the slate clean, Feitell said.

Feitell said that Weg is now negotiating with school officials about his future, which will probably result in Weg leaving his employment.

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Committee Head Proposes H.R. 5158 Changes

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — An amendment that would permit Bell operating companies, along with others providing local-exchange services, to offer enhanced services on a deregulated basis was proposed last week for H.R. 5158, the rewrite of the 1934 Communications Act now making its way through the House of Representatives.

The amendment was one of several proposed by Rep. John Dingell (D-Mich.), chairman of the House Commerce Committee, before which the bill is now pending. If the Commerce Committee approves H.R. 5158, it is believed the bill stands a good chance of being accepted by the full House.

According to the Dingell amendments, the enhanced services that Bell operating companies could offer would include network-based electronic mail; speed, code and protocol conversions; remote data processing; and teleconferencing. As presently drafted, H.R. 5158 gives this privilege only to non-Bell companies.

The enhanced services amendment was offered in two versions — one requiring each Bell operating company to market these services through a separate subsidiary, the other forgoing the subsidiary but requiring the enhanced offering to be "subject to the other [related] provisions of this act."

Those provisions would require the Bell operating companies to grant competitors equal access to their local-exchange facilities and ban the use of revenues from regulated services to cross-subsidize deregulated services.

The Michigan congressman "doesn't believe H.R. 5158 goes far enough to assure the financial viability of the Bell operating companies," according to a knowledgeable Capitol Hill source.

Specifically, Dingell reportedly feels that unless the Bell operating companies are given additional revenue-building opportunities, their securities will not have sufficient appeal for the financial community and the companies will have difficulty raising the money needed to exploit new telecommunications technology.

Competitive Viability

Dingell is also concerned about the competitive viability of the Bell operating companies if they are divested from AT&T as proposed in the antitrust case settlement recently negotiated by the phone company and the Department of Justice.

In addition to letting the Bell operating companies offer enhanced services, Dingell also has proposed an amendment requiring AT&T, as well as all other long-distance communications carriers, to use the local-exchange facilities of existing telephone operating companies until 1988. One possible result of this amendment would be to prevent such firms as Satellite Business Systems; MCI Telecommunications Corp.; Tymnet, Inc.; and Telenet, Inc. from establishing the high-speed Digital Electronic Message Services proposed several months ago to the Federal Communications Commission.

The Dingell amendments are likely to be the first order of business when the House Commerce Committee formally begins considering H.R. 5158. While no date has been set for consideration, sources on Capitol Hill said a good guess would be around May 15 or 20.

Action Promised On Crime Bill

WASHINGTON, D.C. — The sponsor of the federal computer crime bill last week promised some congressional action soon on his bill, versions of which have languished on Capitol Hill for five years.

The Federal Computer Systems Protection Act was introduced last summer by Rep. Bill Nelson (D-Fla.). The bill would make it a federal crime to misuse or abuse any computer system owned or operated by the federal government, a federally insured financial institution or a company with interstate operations.

No action has been taken on the Nelson proposal, a successor to the original federal computer crime bill sponsored by former Connecticut Sen. Abraham Ribicoff. Nelson told the Honeywell Information Systems, Inc. symposium on computer security and privacy here last week that the House of Representatives Judiciary Committee will soon hold hearings on the measure.

While the Ribicoff version of the legislation did see Senate action in late 1979, passage of the bill has been delayed during congressional efforts to rewrite federal criminal statutes and by the absence of an effective constituency pushing for enactment.

Nelson called the bill "essential to the government and to the national economy."

The bill has been referred to the House Judiciary Subcommittee on Civil and Constitutional Rights, which has not yet scheduled hearings. But Nelson said that subcommittee Chairman Rep. Don Edwards (D-Calif.) has promised to take up the legislation soon.

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That's why both parts of *Structured ANS COBOL* show you how to develop programs using structured design, documentation, and coding. So if you're just learning COBOL, *Part 1* will teach you to develop structured programs right from the start. On the other hand, if you're already programming in COBOL, *Part 2* alone will teach you structured-programming methods as it teaches you the advanced COBOL elements.

3 reasons why this course works

In the past 3 years, over 20,000 people have learned COBOL using *Structured ANS COBOL*...in college and university classes, in inhouse training programs, and on their own. Here are a few reasons why the books are effective.

1. The books are organized so you can learn significant skills in a hurry. In *Part 1*, the first 5 chapters teach a complete subset of COBOL that includes debugging and an introduction to structured methods. At that point, you'll be able to write and debug complete COBOL programs. Chapters 6-10 then cover sequential file handling on tape and disk, DOS and OS JCL for COBOL programs, and structured program development.

In *Part 2*, you can go directly to any subject you want to know about after chapter 1 (an introduction to structured COBOL). For example, if you want to know how to write a COBOL sort program, you can start with chapter 7. If you want to know how to use the COPY library, you can go to chapter 4. But you don't have to cover a lot of material you're not interested in to get to what you want to know.

2. The books were written under the technical supervision of Paul Noll, a COBOL expert from industry. Paul has been a software specialist and training manager for Pacific Telephone; he's been manager of the COBOL project in GUIDE, a large IBM users' group; and he now consults in COBOL shops throughout the country. As a result, I'm confident this course is without equal in terms of technical excellence.

3. Much of the structured-programming material comes from a book by Paul Noll, *Structured Programming for the COBOL Programmer*. This book is currently used by dozens of businesses for inhouse training. And many companies have adopted its principles as their standard for program development. So I'm sure you'll find the structured-programming content to be practical, helpful, and a real boost to your programming skill and productivity.

Related courses for the experienced COBOL programmer

If you're already using the COBOL elements covered in *Structured ANS COBOL*, but you're not yet using Report Writer in your shop, you should get a copy of *Report Writer: A COBOL Feature That Can Improve Productivity*. It will teach you how, why, and when to use Report Writer. And all the program examples follow the same structured techniques that are taught in *Structured ANS COBOL*.

If you'd like to learn more about those structured techniques, we have 2 other books designed especially for you. I've already mentioned the first one, *Structured Programming for the COBOL Programmer*. It was developed by Paul Noll to teach experienced programmers a practical way to apply structured methods to COBOL. As I said before, this book is currently used by programmers across the country for in-house training. And many of them have written to say that Paul's methods have made a marked improvement in their programming.

As a reference manual for the development of new programs, Paul created *The Structured Programming Cookbook*. Besides giving standards and guidelines for a structured COBOL shop, this book presents complete solutions for 4 business programs. By using these model solutions as guides for new program development, you don't have to start each program from scratch. This means you can spend less time on the tedious aspects of program development and concentrate on the more challenging ones.

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Court Rules Justice Objection to Ecom Too Late

WASHINGTON, D.C. — The protracted battle over the U.S. Postal Service's controversial Electronic Computer-Originated Mail (Ecom) service ended late last month when the U.S. Court of Appeals here decided that the Justice Department had waited too long to object to the service.

Justice Department attorneys asked the court last December to stop the U.S. Post Office from launching Ecom because the Postal Rate Commission had not approved the service as a permanent offering. The court ruled last month, however, that an Aug. 15, 1980 decision by the governors of the Postal Service legitimized Ecom and that opponents of Ecom, by failing to appeal that decision within the succeeding 15 days, lost their chance to prevent the service's start-up.

The court decision "will give our customers, many of whom have understandably been waiting for this decision, the needed impetus to proceed with their plans to use Ecom," Postmaster General William F. Bolger said shortly after the court's decision was announced.

While the decision removed one cloud hanging over the new service, another remains. The Postal Service had projected an average volume of 385,000 letters per week during Ecom's first year. However, the most it has received so far is 15,000 per week, and the average has been less than 7,000.

Battle Erupts Over Charges For Enfia Tariff

WASHINGTON, D.C. — A major battle has erupted here over charges for Exchange Network Facilities for Interstate Access (Enfia), which consist of the local loops, local trunks and local-switching facilities leased from telephone operating companies that specialized carriers need to interconnect their users.

The Enfia tariff, implemented in 1979, requires each specialized carrier — or other common carrier (OCC), as they are more generally known — to pay a specified amount per minute. The charge is equal to 55% of what local telephone companies are estimated to receive from AT&T Long Lines Division as reimbursement for local-exchange facility costs.

AT&T, on behalf of its operating companies, has insisted that present per-minute Enfia charges do not cover the related local-exchange costs, which means telephone company customers are subsidizing OCC services. The OCCs insist, however, that the per-minute Enfia charge is too high because they are receiving inferior interconnection with local-exchange networks and their users must dial more digits than phone company customers to make long-distance calls.

Last month, shortly before the present Enfia agreement expired, the FCC extended it a maximum of two years. The local-exchange usage rate paid by OCCs will continue to be 55% of the comparable fee paid by AT&T Long Lines, but increases in the billed minutes of use per Enfia line will be allowed.

Immediately afterward, AT&T filed a new Enfia tariff raising the usage factor from the current 3,000 min/channel/mo to 5,823. This change would require each OCC to pay $258.21/mo for each line.

Gary Epstein, chief of the FCC's Common Carrier Bureau, suggested that 4,000 minutes would be "a reasonable compromise." However, AT&T refused to go along with the compromise and filed a separate "conditional petition for emergency action" under which temporary rates specified by the commission would be implemented, subject to an accounting order and adjustment at the end of a five-month investigation.

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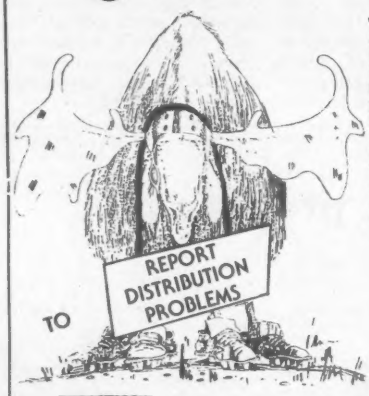

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FAA's Plan to Upgrade ATC System Opposed On a Number of Details

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Federal Aviation Administration's (FAA) plan for a multibillion-dollar air traffic control (ATC) system upgrade, although widely praised for thoroughness and ambition, is running into opposition on a number of its details.

In particular, the Defense Department has complained it would have to spend billions to outfit military aircraft with the new and additional types of on-board electronics systems called for in the FAA proposal.

In addition, the congressional Office of Technology Assessment (OTA) has questioned the basis for some FAA predictions on air traffic growth and noted what the OTA sees as a lack of contingency planning in the computer upgrade plans.

Some Objections

Beyond that, the FAA proposal for financing a new ATC system is raising objections from various quarters in the aviation industry for supposed inequities in the way the plan's cost will be shared by the different segments of the industry.

Despite these objections, the $9 billion National Airspace Systems Plan, unveiled by the FAA with much fanfare in late January, has been generally well received by Congress and the private sector [CW, Feb. 8].

The greatly detailed 20-year plan calls for replacing existing ATC computer hardware and software and phasing in many new types of radar and communications systems. Through the new automation, the FAA hopes to consolidate its operations into a considerably smaller number of facilities, saving almost $20 billion by the end of the century while at the same time increasing ATC capacity and safety.

Although there have been other ATC modernization plans, none has been as detailed or as ambitious as this effort overseen by FAA Administrator J. Lynn Helms. But even before the rounds of applause for Helms' creation could die down, objections began to surface.

The Defense Department, a major user of U.S. airspace, also helps administer the ATC system with the FAA. Yet, the Pentagon said, its concerns about the possible effects of the FAA plan were not sufficiently considered.

Some of the new systems proposed, the department said, will not help the military, but will cost billions to install. One new on-board transponder alone will cost more than $1 billion, according to the Pentagon, costs that must be borne by the taxpayer.

Meetings Planned

The White House Science Council is holding a series of meetings to consider the FAA upgrade plans, meetings that will prominently feature discussions of the economic and technological impact of the FAA proposal on military requirements and budgets.

The FAA's technological and economic assumptions are also being second-guessed by the OTA, which told Congress recently that "while [the plan is] a significant and even bold step compared to past efforts . . . [it] is not without faults."

OTA Director John H. Gibbons told a House appropriations subcommittee "the [FAA's] proposed changes are technologically feasible, and they are consistent with the goal of increasing safety and productivity and accommodating future growth." But, he continued, faulty FAA long-term forecasts for air-traffic growth may have led the agency to reject needlessly some possible technological alternatives.

Also, Gibbons said, the FAA has not adequately developed contingency plans for possible changes in the upgrade schedules necessitated by budgetary constraints or failure to meet engineering objectives.

Different Risks

Gibbons said the FAA's plan to upgrade its hardware and software in stages minimizes technological risk at each stage.

But, he said, "while reducing some kinds of risk, the incremental approach . . . introduces the possibility of an entirely different kind of risk — the risk that hardware choices made in the first stages will limit the options available for the final systems design."

On a related subject, the OTA director took exception to the FAA's decision to replace the current ATC IBM mainframes immediately with larger machines as a basis for future systems development.

The OTA backed, instead, a long-considered alternative for an interim hardware upgrade and ultimate complete system replacement — an option the FAA rejected as too costly and technically cumbersome, Gibbons said.

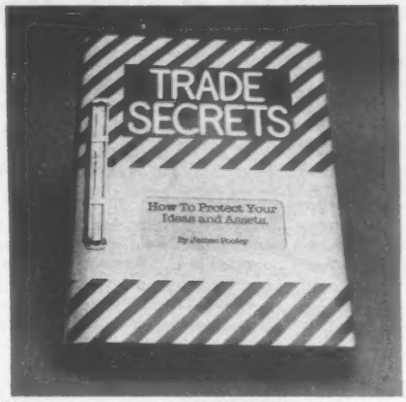
Gibbons, however, disputed Helms' contention it would be difficult to find the hardware to upgrade the FAA's IBM 360 computers. There are sufficient available units in the federal inventory, according to Gibbons, and the short-term upgrade would cost almost $200 million less than rehosting the FAA computers as planned.

Clarification Suggested

Gibbons suggested the need for "further clarification of the tradeoffs" of the two DP options so that Congress can decide on the best method of computer replacement.

Gibbons also noted an unresolved controversy over FAA plans for raising the money to pay for the ATC upgrade. Through a variety of passenger ticket and aviation fuel taxes, the FAA hopes to raise the funds it needs, but Gibbons claimed the burden of cost will not fall equally on each class of airspace users.

According to OTA figures, general aviation companies will be, in effect, subsidized by the proportionately higher taxes paid by airlines and private fliers.



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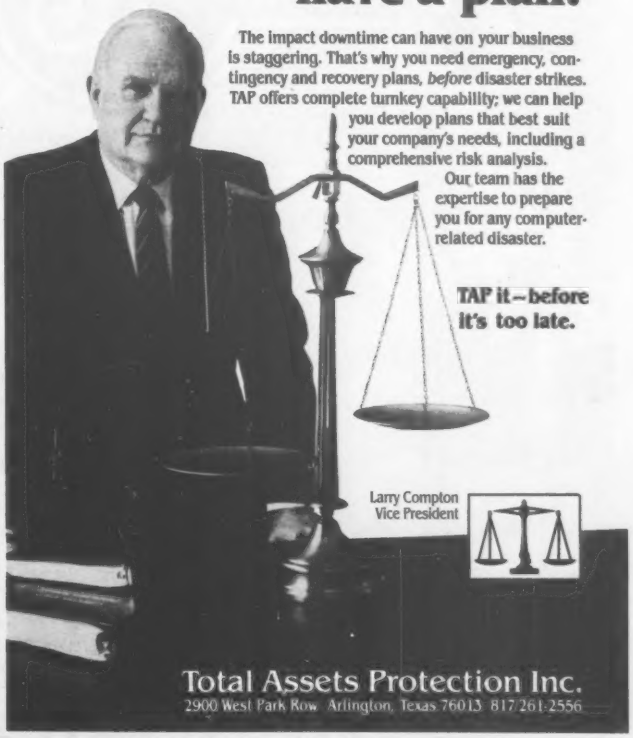

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NCR Chief Reveals Plans for Desktop Systems

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — NCR Corp. may soon follow IBM's lead and expand its processor line to include a family of personal computers.

NCR plans soon to introduce a series of "desktop systems" that will communicate with the company's own existing hardware and with IBM's, according to the Dayton, Ohio-based firm's chairman, William Anderson.

Before year's end, NCR also intends to announce several software development tools and a family of shop-floor data collection systems that can be integrated with the company's I and V series processors, Anderson said.

The programming support aids will include enhancements to the firm's Ezkey offering, additional data management systems and an entry-level Tranpro product as well as various query and report writers. The data collection systems line, by contrast, will be aimed primarily at manufacturers and will operate with NCR's existing IMCS and Mission manufacturing management software.

CW at Nucon

Speaking at last week's twelfth annual NCR Users Conference (Nucon), Anderson volunteered few details about the forthcoming desktop systems line, its technical specifications or its performance features. Nor did he indicate exactly when the product grouping would be introduced, although he did characterize it as "an important part of our current ... development program."

Anderson's passing reference to an upcoming desktop systems announcement lent credence to a view expressed later during the same day by Century Analysis, Inc. President Leonard Lafrance, who predicted NCR's imminent entry into the personal computer field.

"I'm sure they [NCR] will be getting into the personal computer business real soon," he said during a Nucon program session dealing with technology's current and future impact on DP management.

As a supplier of networking software that allows different vendors' equipment to be interconnected, Lefrance's San Francisco-based firm has gained an "intimate knowledge of NCR and its products," he said.

In other comments, Anderson warned his listeners that growing user demands for computing services will force systems managers to install five to 10 times more processing capacity during the '80s than they did during the '70s. "If you don't," he said, "the chances are good that others in your organization will act on their own."

With the advent of inexpensive, easy-to-use personal microcomputers, nontechnical end users are no longer willing to "take a number and then wait patiently until the systems people can squeeze in the work," he added. "Visions of sugarplums, which one day might be available from data processing departments, are being replaced by visions of Apples available today at the local computer store."

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Overpaid Prima Donnas?

No One Likes You, Speaker Tells DP Managers

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — Their bosses often regard them as touchy, overpaid prima donnas who know nothing about business and who speak an insufferable brand of technobabble.

Their subordinates see them as uncommunicative, unappreciative overstrivers who promise the impossible to top management and then expect their staffs to deliver the goods. Even their users complain that they take forever to respond to special requests and almost never deliver a service that works exactly as it should.

DP managers, brace yourselves: Almost no one who deals regularly with the captains of corporate computing speaks of them favorably.

"I don't mean to hurt your feelings," a speaker last week told a group of DP managers at NCR Corp.'s annual users group meeting, "but I have to tell you that your profession is suffering from a serious credibility gap, and the problem extends to executives, users and even to your own employees."

The speaker, Cincinnati-based consultant Don Atkinson, reportedly bases his opinion on years of experience in observing the information systems drama and working closely with its major players at every corporate level. As the head of Atkinson and Associates, he claims to have spoken extensively to top executives, nontechnical end users and computing professionals, and his conversations have led him to one inescapable conclusion: Business people who agree on practically nothing else seem to be united in an almost universal dislike of DP managers.

As if being unpopular were not bad enough, information systems directors also must contend with a second occupational handicap — extreme job complexity. "You folks in DP probably do one of the toughest jobs in American business," Atkinson said, "and your profession is infinitely more complex now than it ever has been before because of the tremendous growth in the number of available solutions."

Until just a few years ago, efforts to meet a company's in-house computing needs revolved almost entirely around the organization's central processing facility. Since then, the range of potential solutions has broadened considerably to include alternative systems like minicomputers, microcomputers and user-controlled software development aids, Atkinson said.

So how do beleaguered information systems heads combat the challenge of growing technological complexity and at the same time boost their dismally low loveability quotient? Much of the answer to that question, he said, lies in demonstrating increased leadership.

CW At Nucon

When dealing with top management, DP executives can improve the quality of their leadership by intimately familiarizing themselves with their firms' business, learning to communicate with their bosses without resorting to technical jargon and spearheading the development of a formal, strategic systems plan.

Atkinson also urged his listeners to become increasingly concerned with the "bottom line" and to make every on-the-job decision "as if you were your company's owner."

When dealing with users, systems managers can demonstrate increased leadership by learning to become "salesmen" of technological change and by involving non-DPers in application development projects, Atkinson said. Computing executives would also be well advised to encourage their users to acquire and learn how to operate their own personal computers.

Report to Cover Software Issues

LOS ANGELES — *Software Protection* is the title of a recently launched periodical published by the Law & Technology Press.

Eight times a year the research report will probe such issues as the current status of legal protection for programs, patents, copyrights and trade secrets; how to protect computer games from piracy; employment agreements and their use in protecting software from employees who leave to work for competitors or start their own companies; the status of computer crime laws and filing criminal actions against software thieves; and the latest in technical advances to protect software from theft or unauthorized use.

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Nucon Showing Signs of Becoming Trade Show

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — NCR Corp.'s annual users group meeting shows all the signs of evolving into a full-fledged trade show.

To the event's usual assortment of formal conference sessions, the Federation of NCR User Groups has recently added something new — a small but steadily growing product exhibit.

The first of these exhibits appeared only last year when approximately 15 vendors sported their wares at the NCR Users Conference (Nucon) in Miami.

Displays Well Received

So well received was the concurrent product display that by the time the users reassembled last week for Nucon '82, the list of on-hand exhibitors had more than doubled to 33.

Conference organizers expect the vendor head count to go even higher next year, according to Royce Callaway, NCR's director of large systems marketing. "We never planned it this way, but it looks like Nucon is quickly turning into a bona fide trade show," Callaway said last week as the event got under way for its 12th consecutive year.

The addition of a supplementary product exhibit marks something of a turning point in Nucon's ongoing evolution. For the first eight years of its existence Nucon remained strictly off limits to all vendors, including NCR itself. The presence of exhibitors was apparently deemed by Nucon officials to be inconsistent with the gathering's high-minded goal of furthering user education and providing DP managers with a means of communicating with their peers.

Today, much of Nucon's original purpose and philosophy remains intact. The meeting's seminar program, which this year boasted more than 80 sessions, still ranks as Nucon's single most important user service, conference director Joe Ternavan told attendees during his opening-day remarks.

But as the annual event has steadily matured, its character and composition have changed dramatically. The first hint of a transformation came in 1978, when a few suppliers of NCR-compatible hardware and software were allowed for the first time to set up modest product "booths" within a few feet of Nucon's meeting rooms.

Three Years Later

Three years later, the ban on vendor exhibits was relaxed completely, and product displays officially became a part of the conference's overall package.

Today, the recent expansion of Nucon's format is resulting in a "new and exciting relationship between NCR, its users and its independent vendors," said the head of one participating firm.

"I think [the advent of a Nucon product exhibit] is a significant development," Computer Enhancement Corp. President Gaetano Cimo added. "Three years ago, you wouldn't have seen anything like it, and I would have had to be here in disguise. Now, you can find my name on the program."

CW at Nucon

Gets Limited Go-Ahead

Expanded 800 Service Goes On-line

WASHINGTON, D.C. — AT&T began offering Expanded 800 Service late last month, shortly after the Federal Communications Commission (FCC) gave a limited go-ahead.

The new offering will enable Wats users to have incoming calls automatically routed to destinations that they specify in advance and can change at will.

One possible user of the service would be an on-line DP service bureau with multiple computer centers. Each center would serve remote terminals within specified telephone area codes.

Alternatively, Expanded 800 Service could balance the traffic coming into a single computer center among multiple computer ports.

Service 'Saves Money'

AT&T claims that the new service will save many Wats customers money by enabling them to use a single 800 number for intrastate as well as interstate calls. Dual numbers are generally required in this instance at the present time.

Expanded 800 Service is one of the first in a series of computer-based, network-resident, on-line information offerings Bell plans to introduce during the '80s. This may be one reason the FCC, while allowing the service to start, has decided to investigate the "reasonableness" of the rates.

ADR Course Series Provides Training on Its Product Line

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) is sponsoring a series of courses said to provide basic and advanced training on the vendor's line of systems software products.

The courses run from one to five days in major metropolitan areas and cover the following products: Vollie, Roscoe, The Librarian, On-Line ETC, Look and Metacobol. ADR/Datacom system products to be covered include: Datacom/DB, Datacom/DC, Datadictionary, Dataquery, Datareporter, Dataentry, Datadesigner, Datacom/DL, Datacom/D-Net and ADR/Ideal.

The courses range in price from $150/person for a one-day course to $600 for a five-day course, according to a release.

ADR is also sponsoring a dozen courses by leading data base consulting firms. Subjects covered include logical data base design, creating logical data models, data base in a distributed environment, data base concepts for auditors and information resource management.

The courses cost from $200 to $750, ADR said from Rt. 206 & Orchard Road CN-8, Princeton, N.J. 08540.

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Safeguards Needed

Data Accumulation Seen Devouring Liberties

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The erosion of personal privacy is like a cancer in our technological society, according to one privacy advocate who sees personal liberties steadily eaten away by the accumulation of computer-based information.

Despite growing U.S. sensitivity to privacy issues and even after a decade of public and legislative debate on these issues, "We have not been sufficiently worried about [the] problem of individual privacy arising from the abuse of technology," George B. Trubow, a John Marshall Law School professor of information law and policy, said here last week.

At fault, he told the annual Honeywell Information Systems, Inc. symposium on privacy and security, is the difficulty of adequately defining "this shadowy notion of privacy" as it relates to technology and the resulting absence of a privacy constituency that can mandate relevant policy formulation.

"Today it's akin to a cancer — the fact that our personal privacy is being eaten away very slowly," Trubow said. He spoke of the growing amounts of information being collected with no regard to the impact on privacy.

Continuum of Effects

And it is not just an individual problem, he said, suggesting there is a continuum of effects on privacy that at the extreme leads to a "social vulnerability" through information collection.

Collections of individual bits of information, he explained, amount to data on blocks of people, such as voting patterns and buying habits, which can be used to motivate large social groups in any number of ways. "A lot of people make a lot of money by being able to predict behavior," Trubow said. "If we can predict behavior . . . we can affect behavior."

In the extreme, this kind of activity is an assault on personal free will, he stated. "When do I get to make up my own mind [and] when do others tell me what to do because they know how to predict my behavior [and] motivate me?" he asked.

Trubow, a White House privacy advisor during the Nixon and Ford years, admitted he and his colleagues have been unable to come up with workable definitions of privacy, let alone any simple guidelines for applying privacy principles to automated information systems. But he suggested two privacy principles for systems designers and managers:

- Do not collect personal information.
- If you have personal information about anyone in any file, do not disclose it.

He conceded these guidelines would be difficult, if not impossible, to follow in many systems, but he proposed them as a starting point for making policies for protecting personal privacy. Use these principles as "a point of departure," he said. "At least I will have some confidence that someone is worried about personal privacy."

The worry is justified, he said, because "information is an inherently dangerous substance when it's personal information and we collect it more and more and make it accessible without constraints."

No Constituency

Systems managers should be actively concerned about privacy, he said, because there is no "constituency for privacy" to lobby for protections. Everyone has divergent views on the subject, he noted. "We're ambivalent; we're not sure; our expectations are different . . . For everyone who says 'protect that information,' there's someone saying 'give me that information.'"

One way to address the lack of policy and hard-and-fast privacy guidelines is "to involve the data subject in the decisions regarding whether and what to collect and whether and what to disclose," he said.

Some direction is needed, according to Trubow, because technology continues to advance at a greater and greater pace "without policy being formulated regarding how we're going to manage information."

In the face of that lack of policy, our personal privacy is being "eaten away" little by little, according to Trubow.

First Standard OKed For Insurance Industry

WHITE PLAINS, N.Y. — What is said to be the first insurance industry data communications standard has been approved for release by the joint Insurance Institute for Research, Inc. (IRR)/Acord Standards Committee.

The "Batch Transmission Session and Message Structure Standard, IIR/Acord Standard Number 110-01" provides for an interface for agent/company electronic communications.

The IIR is located at 222 Mamaroneck Ave., White Plains, N.Y. 10605.

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Integration Said Key To Automated Factory

By Susan Blakeney
CW Staff

CHICAGO — "It is all one factory, so it is all going to be in one data base. The data base will be a model of the factory."

That was the prediction of Dr. John W. Weil, senior vice-president and chief technical officer of Bendix Corp., who delivered one of two keynote presentations at the Information Management Exposition and Conference for Manufacturing (Info/Manufacturing) here last week.

Speaking of "islands of computer applications on the factory floor," Weil urged attendees to "put an end to this isolation" and emphasized the importance of integrating factory automation.

To develop this integrated, automated factory, Weil said, industry will would have to be established. He maintained that this would be a "slow and long process" but a necessary and inevitable one.

Another requirement for improved factory automation is the flow of "quality and accurate information flowing through the factory." Weil believes that linkages should be established between each department and sees this trend happening now to a small extent. Citing the parallel growth of computer and manufacturing technology as an overall trend, Weil contended that the two technologies would eventually merge. "Whatever we do [in the arena of integrated automation] has got to be world class excellence," he concluded.

Following this address was a presentation on "The Japanese Approach to Productivity," from Kenneth A. Wantuck, corporate director of materials management at Bendix.

CW Photo by S. Blakeney
Dr. John W. Weil

Wantuck suggested that because Americans had been leading the world in manufacturing for so many years, "we've gotten a tad too cocky."

The Japanese, on the other hand, have been making tremendous strides in raising productivity levels because of their emphasis on integration, communication and simplicity, Wantuck claimed. More specifically, Wantuck maintained that two basic premises are at the heart of the Japanese success story — the elimination of waste and a genuine respect for people. All the principles of Japanese productivity stem from these two fundamental ideas, he claimed.

"There is no magic — no tricks to this system. It's just fundamental logic," Wantuck maintained. The Japanese "have given us a road map to follow," Wantuck said. "Our levels of productivity have been abysmal and our costs keep going up. Things will continue this way until we get the message."

No Typical Attendees

By Susan Blakeney
CW Staff

CHICAGO — There were no typical conference attendees at last week's Information Management Exposition and Conference for Manufacturing (Info/Manufacturing) here. Interviews at the event revealed a mixture of manufacturing engineers, computer specialists, production supervisors and consultants.

Jeanne Hildebrand and Mary Whiskeyman, two NCR Corp. systems analysts, came to the show from nearby Aurora, Ill. They wanted to see both their employer's display booth and "what the competition has," Hildebrand said.

James Best of Textron, Inc. was disappointed in the exposition because "the only thing they offered was demo code . . . when you asked them for application code, they didn't have it. It doesn't exist."

Kenneth Huss, a manufacturing engineer from Deere & Co., echoed Best's sentiments. He went to the show "looking for some software . . . but found nothing that's precisely what we're looking for.

"NCR comes close," Huss continued, "but we've got a very special inventory control application. There's no software made for it, and we'd like to avoid writing it ourselves."

Huss and a co-worker, systems engineer Dawn Barkema, were also hoping to see more bar code scanning innovations and voice recognition equipment; they were disconcerted by the lack of hardware. "We haven't seen anything really new here," they agreed.

Tom Johnson from Custom Systems, Inc. was looking for "smart peripheral equipment that would help my company integrate its existing technology and manufacturing operations.

"I've seen some improvements in existing technology here in cost and functionality, but I certainly haven't seen any breakthroughs. I didn't really expect to, but I was hoping for a few new products or new ideas . . . I had higher hopes," Johnson explained.

Johnson did not find the factory routing devices such as sorters, converters and selectors, which had lured him to Info/Manufacturing. "The big failing at this show is that the major computer manufacturers that are here are trying to create computer specialists rather than manufacturing specialists," he said.

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University Summer School Retraining College Professors To Teach Computer Science

By Marguerite Zientara
CW Staff

EVANSVILLE, Ind. — In a move believed to be one-of-a-kind, the University of Evansville is offering a summer school master's degree program to retrain college professors from any discipline to teach computer science.

As an effort to mitigate the dismal lack of DP educators in the U.S., the university this year will inaugurate its Master of Science in Computer Education program. The program requires two summers of study and the supervised teaching of two DP courses in the intervening school year.

While other educational institutions offer noncredit or accredited nondegree programs in computer science for professors in other disciplines, "no one else that we know of runs a degree program or one strictly for the summer," Dr. William Mitchell, chairman of the university's Department of Computing Science, explained.

A candidate for the master's degree in computer education must be a full-time teacher, have a master's or higher level graduate degree and is expected to have some experience with computer systems. Applicants are also expected to be knowledgeable in "at least one high-level programming language," according to the brochure describing the program.

Further information about the Institute in Data Processing and the Master of Science in Computer Education program at the University of Evansville is available from Dr. William Mitchell, University of Evansville, P.O. Box 329, Evansville, Ind. 47702.

Admission to the program is limited to 25 and is "competitive, so applicants may be required to certify their preparation by taking a placement examination," the brochure continues. The program is aimed at faculty from small colleges with enrollments under 5,000.

Courses offered in the program are systems analysis, computer hardware, data structures and programming, systems software, undergraduate computing curricula, practicum and comparative programming languages.

Could the university find itself training people who will leave teaching altogether for the lucrative world of commercial data processing? "I see that as a possibility, but not a very good likelihood," Mitchell said, noting, "The program is not aimed that way.

"There have been several programs that universities have put on with that in mind, to try and get teachers out there," Mitchell observed. "But within the small colleges, the deans and academic vice-presidents of colleges are nominating faculty members who have long tenure with the college, but who have displayed the energy and the interest in changing disciplines.

"Basically, they can't hire people on the open market who can come in and teach computing at the college level because the large universities are grabbing up all the people there are," Mitchell explained. "So they are instead taking the option to retrain their own faculty, faculty who have no interest in going out and working in the real world. They're already dedicated teachers and most of them have 10 or 15 years tenure.

"So I think the college administration sees it as a relatively safe bet," he said. "There's always the risk — you are giving a person a skill that is salable in the outside world, so you're increasing potential mobility, but of the 16 people I've dealt with so far that we've admitted into the program, all have strong commitments to the college that's supporting them to come."

Enrollees so far are from disciplines "across the board," Mitchell indicated, although "the majority are mathematicians, because in small colleges the computer is usually located in the math department."

Another Option: DP Institute

EVANSVILLE, Ind. — In addition to its Master of Science in Computer Education program, the University of Evansville has offered a week-long "Small College Institute in Data Processing" since 1980.

The purpose of the institute is "to make the college faculty who attend aware of what the data processing field is about," according to Dr. William Mitchell, chairman of the Department of Computing Science at the university.

Mathematicians at most colleges "have little idea of what commercial data processing is because they don't read trade newspapers and their only contact with computing is likely to have been a numerical analysis course when they were in college or what they have learned on their own using a microcomputer," Mitchell said.

"They just don't know what systems analysis is, they don't know what we're talking about when we speak of doing systems design, they don't know any of the buzzwords," he continued.

Institute attendees from the mathematics and science disciplines should be those who "have some acquaintance with programming, but who need to acquire a data processing perspective in order to prepare students for commercial careers," the institute brochure explains.

Participants from science, social science and business departments should be "faculty who need to acquire computer concepts and skills so they may teach computing science at the level of the introductory pro

(Continued on Page 18)

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Legislature System Lacks Anti-Abuse Safeguards

By Susan Hurley
CW Staff

SACRAMENTO, Calif. — Ideally, the computer system being installed here at the California State Legislature will cut down on paperwork by providing an electronic mail system and by making copies of reports on bills and legislation more easily accessible to politicians and the media.

There is no practical way to prevent legislators from using the system's printers for less noble tasks such as printing up campaign fund raising or personal letters, according to Legislative Counsel Bion Gregory.

However, although the system can print form or pattern letters in batches up to 100, it is incapable of printing the large numbers of letters needed for most fund-raising jobs. "You'd die of old age before [finishing]," Gregory maintained.

In addition, the chance of being exposed would probably serve to keep legislators from misusing the system, he said. "That information would get out and the press [would] gleefully report on it.

"We're basically relying on the integrity of the individual member," Gregory said, adding the "same inhibitions" legislators have about misdeeds now will exist once the system is in place.

Installation of the IBM 8100-based system, which includes printers and terminals, began in December. It will be July 1983 before the entire building, including members and committee offices, are hooked up, William Eubanks, chief of data processing for the legislative counsel's office, said.

The 8100 will replace an IBM mainframe in the legislative counsel's office. Each of the 120 legislative offices will have two terminals with word processing capabilities and one printer. Legislative committees will start with three terminals and one printer. Depending on work loads, legislators and committees can get additional terminals and printers if needed, Eubanks explained.

Installation of the system is taking place about one year after members of Gov. Edmund G. Brown Jr.'s staff were criticized by a government monitoring agency, the Fair Political Practice Commission, for obstructing an investigation. The agency claimed that staffers used public funds to develop a computer-based mailing list for Brown's political benefit. Brown was cleared of any involvement in the matter [CW, July 20, 1981].

Once installed, the system will enable legislators to use electronic mail to communicate with each other and to access legislation analysis, Gregory said. Policy and fiscal committees will be able to access reports and other information on particular legislation without having to use duplicate copies, he added. Members of the media will have access to the system, but the technical details have yet to be adressed, Gregory said.

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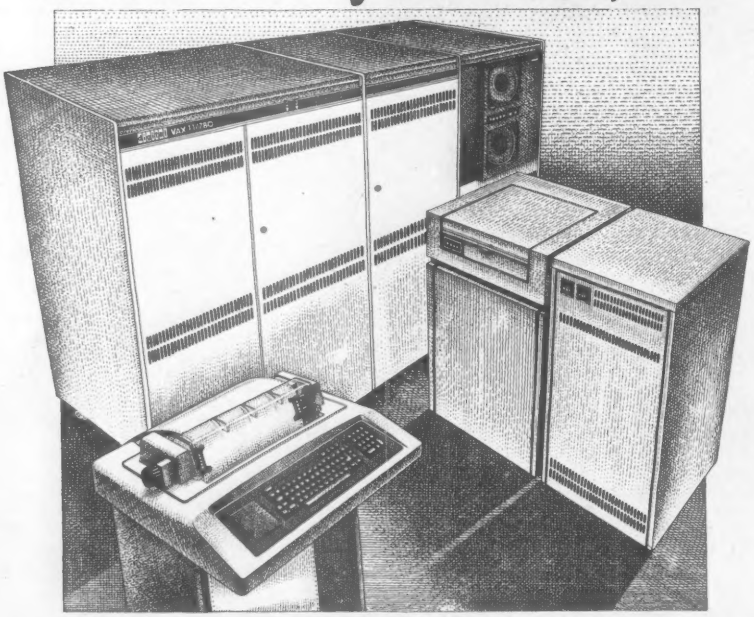

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School Boasts DP Institute

(Continued from Page 17)

gramming course or the computer and society general education course," the brochure says.

The most frequently requested short courses include: development of a computing curriculum in a small college, introduction to information systems and systems analysis, concepts of file and data base processing and an overview of commercial DP and the software life cycle.

Also among those most often requested are: computer hardware fundamentals; computer-assisted learning; word processing, data communications and other business currents; survey of programming languages; teaching structured programming in Cobol, Basic or Pascal; introductory Basic; and concepts for a first course in computing.

With enrollment limited to 50 this year, Mitchell pointed out that the enrollment has grown 50% each year and "we expect 50% growth this year as well."

Back-End Systems Urged For Storage Management

By Brad Schultz
CW New York Bureau

ANN ARBOR, Mich. — DP users may soon pull more bytes off mass storage than their host systems can chew unless vendors make set theoretic back-end systems widely available, according to the data base administrator (DBA) for hundreds of military hospitals.

Set theoretic back-end systems would serve a storage management function, explained Clifford Kuhl of Vector Research, Inc. here, differentiating between that function and two others: information management and data management. Kuhl works as the DBA for a Vector Research client, the Pentagon's Health Affairs Division.

Information management is management of what is put into mass storage, data management is management of how that information relates to where it is put and storage management is management of where it is put, Kuhl said in a recent interview.

Users want more mass storage capacity. But so much more capacity is coming their way that many users could have trouble finding and applying the data put into mass storage unless they have set theoretic back-end systems to employ, he warned.

Back-End Systems

Back-end systems are processors installed between the host computer and mass storage. During the past 12 years, the set theoretic approach to storage management has been championed by David L. Childs, whose company — Set-Theoretic Information Systems Corp. (Stis) of Ann Arbor — plans to market back-end systems that perform the set theoretic storage management function on IBM 4341 processors.

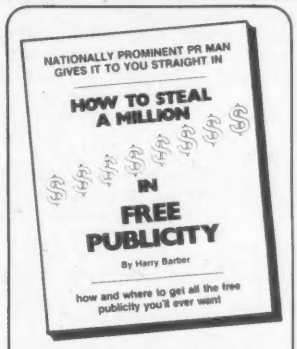
Such back-end systems would come in the nick of time, according to Kuhl, because the set theoretic approach, which maps the end user's perspective of information into whichever storage structures were established for the disk media at his disposal, is far faster and less taxing of host resources than any known alternative approach. Conventional mainframe systems bind the end user to data searches that can swamp host resources when a single query entails investigation of several megabytes, Kuhl noted.

The Vector researcher cited one user organization that has banned on-line access to a 10M-byte data bank for that reason. Yet many users already have data banks featuring on-line access to gigabytes of interrelated files. Videodisk technology is expected to give users as much as a thousandfold extension of on-line mass storage capacity after rewriting on the laser-based medium becomes widely affordable.

Stis was founded in 1970 as a direct result of mathematical concepts developed between 1966 and 1968, funded by the Defense Department's Advanced Research Projects Agency. In 1972, the General Motors Corp. Warranty Information Center became the first user of the basic product Stis hopes to package in 4341s — Set Theoretic Data Spaces.

Last December, Kuhl wrote Stis President Franklin Westervelt: "Being able to view the data as sets and being able to perform set operations on the entire collection of data gives the user tremendous breakthroughs in performance," Kuhl told Westervelt. "Large collections of data, which encompass millions of records, are processed in a fraction of the time expected with traditional record-oriented methods."

According to Kuhl, with set processing, "often only one command is necessary to retrieve all the records that are to be processed for the final result."



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EASTERN

Love and Death Figure in $155,000 DP Scam

By Jim Bartimo
CW Staff

BLOOMINGTON, Minn. — A dead child, a love triangle and a computer scheme all contributed to the swindling of some $155,000 from Magnetic Peripherals, Inc. (MPI), a Control Data Corp. subsidiary, by a ficticious computer parts company here.

While an MPI employee, Barbara Rae Teats manipulated MPI's accounts payable system to create a bogus company to which payments were made over a two-month period in 1979, according to a criminal complaint filed by Dennis Berry, an investigator with the Economic Crime Unit of the Hennepin County District Attorney's Office.

Teats has pleaded guilty to criminal charges and is awaiting sentencing, according to sources in the district attorney's office. Her live-in boyfriend and alleged partner in the scheme, Ronald Allen Puppe, has pleaded innocent to the same charges and awaits trial.

Graveyard Visit

According to the complaint, Teats was transferred to MPI's accounts payable department in May 1979 and discussed with Puppe the possibility of stealing money from MPI. Teats told Berry that she and Puppe went to a local graveyard and obtained the name of child who had died shortly after birth.

Then the couple obtained the birth certificate of the deceased child, Gary Robert Randolf, from the Hennepin County Government Center. With the birth certificate, they were able to open a bank account, obtain picture identification for Puppe and establish an address for the G.R. Randolf Co. at an answering and mailing service, the complaint said.

Teats obtained legitimate receiving documents that came from companies supplying MPI with parts and materials. She then assigned legitimate part numbers to the fictitious company's receiving documents. This made it appear to the MPI computer that the G.R. Randolf Co. was supplying parts to MPI for which payment was required, the complaint said.

Five Checks Deposited

Five checks totaling $155,000 were obtained by the false company in August and September 1979. These checks were deposited into the G.R. Randolf savings account, from which both Teats and Puppe could withdraw, the complaint said. Around the time the last check was received, Teats terminated her employment at MPI.

Investigators said that the couple traveled to Costa Rica, Panama, Florida, California and Phoenix, invested in gold Kruggerands and bought three cars — one each for Teats and Puppe and one for Puppe's former wife.

A $53,000 cashier's check was cashed at the MGM Grand Hotel in Las Vegas by both Teats and Puppe and a large portion of the money was used to buy Pup's Liquor Warehouse located here, the complaint said.

It was while the couple was in Florida with $40,000 in cash that they had a "bad fight, at which time the police were called in," the complaint said. Fights such as these eventually lead to the discovery of the otherwise overlooked crime, according to arresting detective Bob Druke.

"They had broken up for a while," Druke said, "they got back together again in 1980 and started this liquor store. He was running the store when we came to arrest them."

Triangle Breaks Case

What broke the case? "He assaulted her. He had a three-way love triangle going on with her [Teats] and his [ex-]wife," Druke said. Teats "turned herself in. I guess she just had enough," he said.

According to Druke, the statute of limitations in Minnesota would have run out on the crime in the summer or fall. "The company [CDC] was doing a phenomenal business at the time and they were too busy to build in any safeguards [for the computer]," he said.

Berry interviewed Teats for the information contained in the complaint on March 18. Puppe was arrested on April 2. The penalty for the offense is up to 10 years in prison and/or a $10,000 fine.

MPI would make no comment on the case, but a spokesman confirmed that the company filed a civil suit immediately after Teats' arrest. According to Druke, CDC will receive the inventory from the liquor store if Puppe is found guilty.

"The funny thing is that the liquor store is only about a block from CDC's headquarters," he said.

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Deltak Three-Course Series To Be Taught on Apple II+

CHICAGO — At an Access '82 conference held here recently, Deltak, Inc. introduced three course series covering Cobol, systems development and how to develop other course series.

All three series are taught on Apple Computer, Inc.'s 48K-byte Apple II+ microcomputers.

"Structured ANS Cobol: Entry Level" (series 26-2XX-ME) was designed for students with little or no experience in programming who perform in a structured programming environment. This series includes Introduction to Data Processing, Introduction to Business Systems, Program Structure and Program Logic.

"The System Development Series" (series 27-OXX-ME) offers an approach to designing and developing computer-based information systems. Some courses in this series allow the student to modify the Deltak system development approach for use by a single developer.

There are eight courses designed to help students identify and perform the tasks in each stage of the development process, to teach the basics of data gathering, data analysis and documentation for various phases of development.

The third course series was "Authoring in Pass" (series 1-91X-ME), which is aimed at management and training staff personnel who want to build courseware using Bell & Howell's Professional Authoring Software System (Pass) for Apple II+ micros. Prior experience with computer-assisted education or DP is not needed, the spokeswoman said.

"Authoring in Pass" teaches how to create instructional units using the Non-Prompting Editing System and how to use the Pass answer analysis structure to provide individualized feedback to questions. The series also teaches how to design screen displays using Pass graphics and text commands and how to interface videotape or disk media with Pass lessons.

All three course series are available for purchase or rental through Deltak's Deltavision Library Plan. Courses rent for $50/mo to $125/mo/course, depending on the volume ordered. Deltak is headquartered at 1220 Kensington Road, Oak Brook, Ill. 60521.

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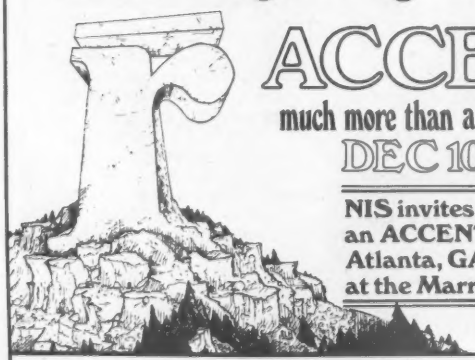

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Despite New-System Bugs

IBM Personal Generates User Satisfaction

By Hillel Segal
Special to CW‡

A slow performance in the accounting problem and mediocre scientific/engineering test performance were yielded by the IBM Personal Computer. But overall quality of keyboard and screen was considered excellent, as was the system documentation.

A bug discovered in the unit's processing of certain arithmetic operations clouds the horizon, at least as this is written. IBM may need to reissue some read-only memory chips containing the Basic language in order to rectify the problem, discovered by a Minneapolis programmer and consultant.

David S. Wolaneck discovered the bug when his program called for division of .1 by 10. The computer's answer was .001, erring in placement of the decimal point. We understand that IBM has acknowledged existence of the bug.

Problems with a new system, of course, are all too familiar. The Apple Computer, Inc. Apple III had its bugs, and was eventually reintroduced by Apple when all was straightened out. Every system goes through a shake-out period when models first hit the field.

Because of this, the Association of Computer Users recommends that users avoid being guinea pigs for the manufacturer. We generally suggest at least six months to one year pass following initial shipments before accepting delivery on a new system.

Large corporations with a great deal of computer experience are in a better position to experiment. But even they should be careful, and use manual procedures or another computer side-by-side with the new system for a substantial period of time.

5120 Disappears

In this issue we are covering results of the IBM 5120 as well as the Personal Computer. The 5120 is no longer offered by IBM; the system was so short-lived that by the time the ACU had published its benchmark report, the system had been outmoded by the introduction of the IBM Datamaster and the Personal Computer. Nevertheless, we include the results alongside those of other systems tested during the series, simply for the sake of completeness.

The 5120 replaced IBM's earlier small system entry, the 5110, offering a somewhat larger CRT (9 in.) and the APL languages or Basic. Its times were a bit curious ... moderately fast on the accounts receivable test but rather slow (last place) in the scientific/engineering problem.

The Personal Computer did much better in the scientific/engineering test, cutting the 5120's time roughly in half to finish in 17 min, 29.6 sec. But, paradoxically, the Personal Computer's accounts receivable time was double that of the 5120, finishing in 9 min, 21.8 sec.

The biggest difference between the two systems, however, is undoubtedly the price tag: The 5120 cost $13,705 as tested (including printer), while the Personal Computer at $4,550 was one of the lowest priced systems in the entire series.

There are other, less visible differences, however. IBM changed its entire marketing position in order to bring out the Personal Computer, evidently feeling that data processing marketing concepts it has always relied on would not be successful in the home and small business markets. For the first time, IBM offered hardware and software made substantially by others, even inviting the world to inspect its internal details and add enhancements. The result, given time, will be a variety of software and program options sufficient to compete with those available for the Apple.

Already independent producers are delivering add-on boards, new processors, disk drives, monitors and so on. Software is beginning to be available as well.

The surprising thing is that IBM, always a cards-to-the-vest player before, chose to follow Apple's lead rather than the style of Radio Shack, which makes little effort to accommodate Brand X add-ons and outside software.

One other change in marketing strategy is the form of sales outlet: The system is sold not only through the manufacturer but at Computerland Corp. and Sears, Roebuck and Co. computer stores as well.

But enough of philosophy — on to the details of the system itself. The Personal Computer as tested included its Intel Corp. 8088 processor, 40K bytes of read-only memory containing operating system and Basic language and 64K bytes of user memory. It also had two 5-in. disk drives with 160K bytes of storage each. The system had a detachable keyboard and used a monochrome display along with the required display adapter board. A modified Epson America, Inc. MX-80 printer supplied under the IBM label rounded out the test system.

The keyboard is identical to that offered on the System/23 Datamaster, using a standard key layout, 10 functiton keys, a numeric keypad and cursor keys. It comes with a 6-ft coiled cord. Benchmark testers said that it was of very high quality. They also liked the monochrome screen, providing white characters of good resolution on a green background. The screen displays 25 lines of 80 characters each.

The monochrome monitor does not provide high-resolution graphics; these are available with a separate CRT interface card and color TV or monitor. The color/graphics option decreases the resolution of characters but includes dot-addressable color graphics. The same interface card also supports the light pen option.

The operating system, IBM DOS, was written by Digital Research, Inc. and is very similar to CP/M in user interface and utilities. The language included is an enhanced version of Microsoft, Inc. Basic. A screen-oriented program editor is included. CP/M-86 and the UCSD P-System are other systems to be available.

IBM-offered software is generally written by an outside source, but the Personal Computer has been tested and documented by IBM. The Business Series includes word processing, Visicorp's Visicalc, general ledger, accounts payable and accounts receivable. The accounting programs are based on Peachtree Software, Inc. software.

The Education Series includes a Typing Tutor, Fact Track and Authentic Game Set. The game Adventure is among the entertainment programs available.

Documentation a Highlight

IBM documentation for the system and software was rated very highly by benchmarkers, who said that it was well organized and indexed. DOS and Basic commands are listed on separate pages in alphabetical order. The descriptions give syntax, parameters and examples of usage. The hardware manual was also praised: "an unexpected pleasure to read," researchers commented...

IBM did not provide names of users to contact for a survey, but a check of several local customers indicated general satisfaction. Expectation of forthcoming software was on the minds of several; one needed more disk capacity, but the system's high overall quality met with general approval.

Of course, IBM will have to do something about the recently reported arithmetic bug. As Mr. Wolaneck commented, "Everyone assumes that computers do arithmetic correctly." No question about that, I'm sure, even at IBM.

Segal is president of the Association of Computer Users, a nonprofit association with members in the U.S., Canada and several other foreign countries. A package of information about the Association of Computer Users is available from the group at P.O. Box 9003, Boulder, Colo. 80301.

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	C-1 Scientific Engineering Time (min)	C-3 Accounts Receivable Time (min)
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North Star Horizon	12:01.9	1:57.7
Cromemco System Two	14:52.6	2:48.0
Texas Instruments 771	22:05.4	3:38.1
Vector Graphic System B	19:30.0	5:56.5
Decstation 78	7:55.7	4:21.5
Radio Shack TRS-80 Model II	20:00.7	3:38.6
Apple II+	21:11.0	6:17.4
Digital Microsystems DSC-2	13:24.9	3:28.8
Ohio Scientific C3-A	12:10.7	15:49.3
Alpha Micro AM-1011	5:18.3	3:25.3
Data General CS/10 Model C1*	58:21.0	*
SD Systems SD-200	17:42.8	6:16.4
Wang 2200SVP	2:13.3	2:23.0
Altos ACS8000-15	7:54.5	10:41.5
Altos ACS8000-6*	7:54.5	1:35.1
NEC Astra 205	14:27.9	5:10.8
Dynabyte 5300	5:39.5	4:38.0
Billings BC-12 DF2M	21:48.6	5:09.2
Smoke Signal Chieftain 9822	3:13.3	1:40.7
Commodore CBM-8032	23:45.1	3:36.0
Vector Graphic 3005*	11:34.1	2:26.9
Xerox 820	24:37.0	5:30.1
IBM Personal Computer	17:29.6	9:21.8
IBM 5120	35:29.7	4:16.2

* Tested with hard-surface disk rather than floppy.

This is the 52th in a series of articles giving the highlights of benchmark tests conducted on popular small computer systems. The full reports are available from the Association of Computer Users.

Nominations for Hopper Award Now Being Accepted by ACM

NEW YORK — Nominations for the Grace Murray Hopper Award are now being accepted by the Association for Computing Machinery (ACM). The award is presented annually by the ACM to an outstanding young computer professional who has made a recent single major technical or service contribution to the computer industry.

To qualify, candidates must have been 30 years old or less at the time the qualifying contribution was made. Emphasis will be placed on outstanding contributions in the fields of data processing and/or personal computing.

The award includes a $1,000 donation from the Univac Division of Sperry Rand. The award will be presented at the opening of the Association's annual conference in Dallas on Oct. 25.

The following information should be included with the nominations: name, address and phone number of the nominee and the person making the nomination; a statement of 200 to 500 words describing the contribution and why the candidate deserves the award; the date of birth of the nominee; and the date on which the qualifying work was completed.

Nominations, which can be made by the nominees themselves, should be sent by June 15 to David C. Wood, The Mitre Corp., 1820 Dolly Madison Blvd., McLean, Va. 22102.

Conference Set For 204 Users

DENVER — The Spring Conference of the International 204 Users Group is slated to take place here May 24-26.

Users of Computer Corp. of America's data base management system will be addressed on the subjects of "Leadership and Motivation in the High Technology Environment" and "Productivity in the DP Department." Group discussions will cover relational data bases and related issues.

The conference fee is $125 until May 10 and $150 thereafter. Details can be obtained from William Case, Model 204 Users Group, P.O. Box 3115, Crofton, Md. 21114.

Security Meet Scheduled May 24-28

ORLANDO, Fla. — The First Annual International Association for Computer Systems Security Conference and Exhibition (IACSS) will be held here May 24-28. This event is being sponsored by the International Association for Computer Systems Security, Inc.

The conference program features 28 paper presentations, eight three-hour workshops, a computer systems security hardware/software exhibition and a Distinguished Service Awards banquet. A sampling of the conference agenda includes sessions on disaster recovery, quality assurance, audit and control, risk analysis and computer-crime prevention.

Registration for the 4½-day conference is $750. Additional information is available from IACSS Registrar, Six Swarthmore Lane, Dix Hills, Long Island, N.Y. 11746.

'Survival' Theme Of Gmis Meeting

SAVANNAH, Ga. — "How to Survive in the '80s" is the theme of the Government Management Information Sciences' (Gmis) conference to be held June 13-17 at the De Soto Hilton here.

The conference is being cosponsored by several companies including IBM, Nixdorf Computer Corp.; Pansophic Systems, Inc.; Systems and Computer Technology Corp.; Sperry Univac; and TRW, Inc.

Topics to be discussed at the conference include maintenance cost escalation, new approaches to project development and project management, how to handle budget reductions in personnel and equipment and how to decide whether to develop or buy new software.

Conference fees are $62 for Gmis members, $72 for nonmembers, $10 for students and $30 for spouses. Fees should be received by May 14.

Registration fees should be sent to Frank Strausbaugh, P.O. Box 1027, Savannah, Ga. 31402.

Bank Institute Forms Security Committee

ROLLING MEADOWS, Ill. — The Bank Administration Institute here announced the formation of a Data Security Committee to help the banking industry reduce the risks and exposure associated with data gathering and processing systems.

The committee, working in conjunction with the institute's Audit, Security and Operations and Technology Commissions, plans a comprehensive program of education, publishing and research.

A workshop, set for May 24-25 in Schaumberg, Ill., will examine the elements of data asset protection and the role of the data security officer. A three-day conference, slated for March 1983, will cover the varied needs and experiences of data security practitioners. Further details on the committee can be obtained from the institute at 60 Gould Center, Rolling Meadows, Ill. 60008.

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Wang Unveils Plan to Emphasize Post-Purchase Support for Users

LOWELL, Mass. — If you are a Wang Laboratories, Inc. customer who is dissatisfied with the quantity and quality of Wang's post-purchase support, help may be on the way.

Last October, Wang announced "The Entitlement Program," which specifically defines by product the amount and form of support due to customers. The program covers such areas as consulting, documentation materials and education.

According to a Wang spokesman, support was "not at all" well defined in the past. Many users did not realize what they were entitled to, and Wang provided only as much help as needed at the time it was required, he acknowledged. Part of the problem was the inability of local support people to deal with the volume of requests.

Now, the firm is said to be emphasizing consistency. "We want to be able to provide the same level of support to any customer in any location," the spokesman declared.

Although Wang sent out letters to its customers notifying them of The Entitlement Program, some of them may not have been reached. "I'm sure there are some who have not been appraised," he said.

The most likely customers to have missed the mass mailing are those who are not currently buying systems. Considering the age of many installed Wang products, that number could include a large group of users.

Any Wang customers who want to take advantage of The Entitlement Program should contact their local Wang sales office.

OA Professionals Organize Nonprofit Society

RIDGEFIELD, Conn. — The Society of Office Automation Professionals (Soap) has been organized and incorporated as a nonprofit entity.

The society, which hopes to fill the need for an integrated perspective on office automation, has identified four specific goals: to promote office automation as a profession, to encourage standards of professional excellence, to facilitate communications throughout the international community and to promote relevant research, standards and public policy.

N. Dean Meyer was elected president of the group. Members of the board represent different segments of the office automation field, including government, vendors, consultants and corporate users in the U.S., Canada and Europe.

Additional information about Soap is available from Meyer at 233 Mountain Road, Ridgefield, Conn. 06877.

Dema Meet To Examine DP Skills

MINNEAPOLIS — The skills and practices needed to survive as a manager in the data entry field will be the subject of a 2½-day miniconference and professional growth seminar slated to take place here June 14-16.

The conference will be conducted by the Data Entry Management Association (Dema).

Sessions at the miniconference will concentrate on ways to improve data entry operations. According to a spokesman, subjects to be covered include motivation and incentive systems, designing the data entry department, setting work standards and developing training programs.

The group of speakers addressing the conference attendees includes:

Norman Bodek, president of Dema; Paul Banks, manager of productivity improvement at the Bank of America; Mary Lee Pyles, president of Data Conversion Specialty Corp.; Gary Tolbert, central support manager for Electronic Data Systems Corp.; and Phyllis Clark, operations analyst at The Computer Co.

The seminar will be conducted in a workshop-type style, focusing on the improvement of managerial skills, according to a spokesman.

Registration for the miniconference only is $225 for Dema members and $265 for nonmembers.

Fees for both the miniconference and the seminar are $435 and $475, respectively.

Further details can be obtained from Dema through P.O. Box 3231, Stamford, Conn. 06905.

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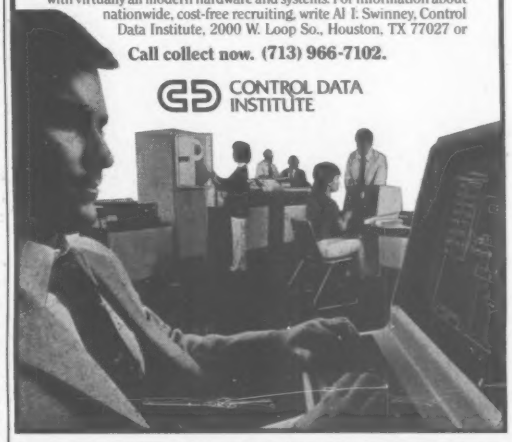

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Insurance Firm Offers Computer Access Policy

EVANSTON, Ill — An insurance underwriting firm here has designed a policy to protect businesses against unauthorized computer access and resulting financial loss.

The policy from Shand, Morahan & Co. provides coverage for expenses such as the cost of restoring the computer system to its condition prior to unauthorized access; any extra expenses incurred to continue business, including renting time on other computers; and other pecuniary losses, including those that might result if accounts receivable records were destroyed.

Limits of liability to $10 million are available.

Shand, Morahan & Co. is located at One American Plaza, Evanston, Ill. 60201.

'Changing Frontiers'

DPMA of Canada to Meet May 16

EDMONTON, Alta. — A conference entitled "Computers ... The Changing Frontiers" sponsored by the Data Processing Management Association of Canada, Inc. (DPMA) will be held here May 16-19.

Topics to be discussed at the conference include developments in hardware, software, development and management techniques.

Keynote speakers will include Dr. Adam Osborne, President of Osborne Computer Corp. of Hayward, Calif.; Yumio Imamura, director of Systems Engineering Support Department, International Operations, Fujitsu, Japan; and Dr. John Madden, president of Microtel Pacific Research Ltd., Vancouver, B.C.

Cost for the conference is $280 for DPMA members, $330 for nonmembers and $75 for spouses.

Further information about the conference or registration can be obtained from Info Canada '82, 12404-39A Ave., Edmonton, Alta. T6J OP3.

Siged to List College Courses In Directory

WASHINGTON, D.C. — A directory of academic programs in information science is being compiled here by the Special Interest Group on Education for Information Science (Siged) of the American Society for Information Science (Asis).

A questionnaire has been sent to about 200 U.S. and Canadian universities that offer information science programs at the undergraduate and graduate levels. From these responses, schools will be selected by Siged for inclusion in the directory.

Siged intends to update the directory on a regular basis. Further details can be obtained from Asis at 1010 Sixteenth St., N.W., Washington, D.C. 20036.

UCCS' Couger Recognized

COLORADO SPRINGS, Colo. — Dr. J. Daniel Couger of the College of Business and Administration, University of Colorado at Colorado Springs (UCCS) was named distinguished professor of computer and management science by the university's Board of Regents recently.

The rank of distinguished professor is awarded by the Board of Regents to faculty members who have "distinguished themselves as exemplary teachers, scholars and public servants and who are individuals having extraordinary international importance and recognition."

Couger is the first faculty member at UCCS to receive this honor; he is also the first member of a professional school to be so honored.

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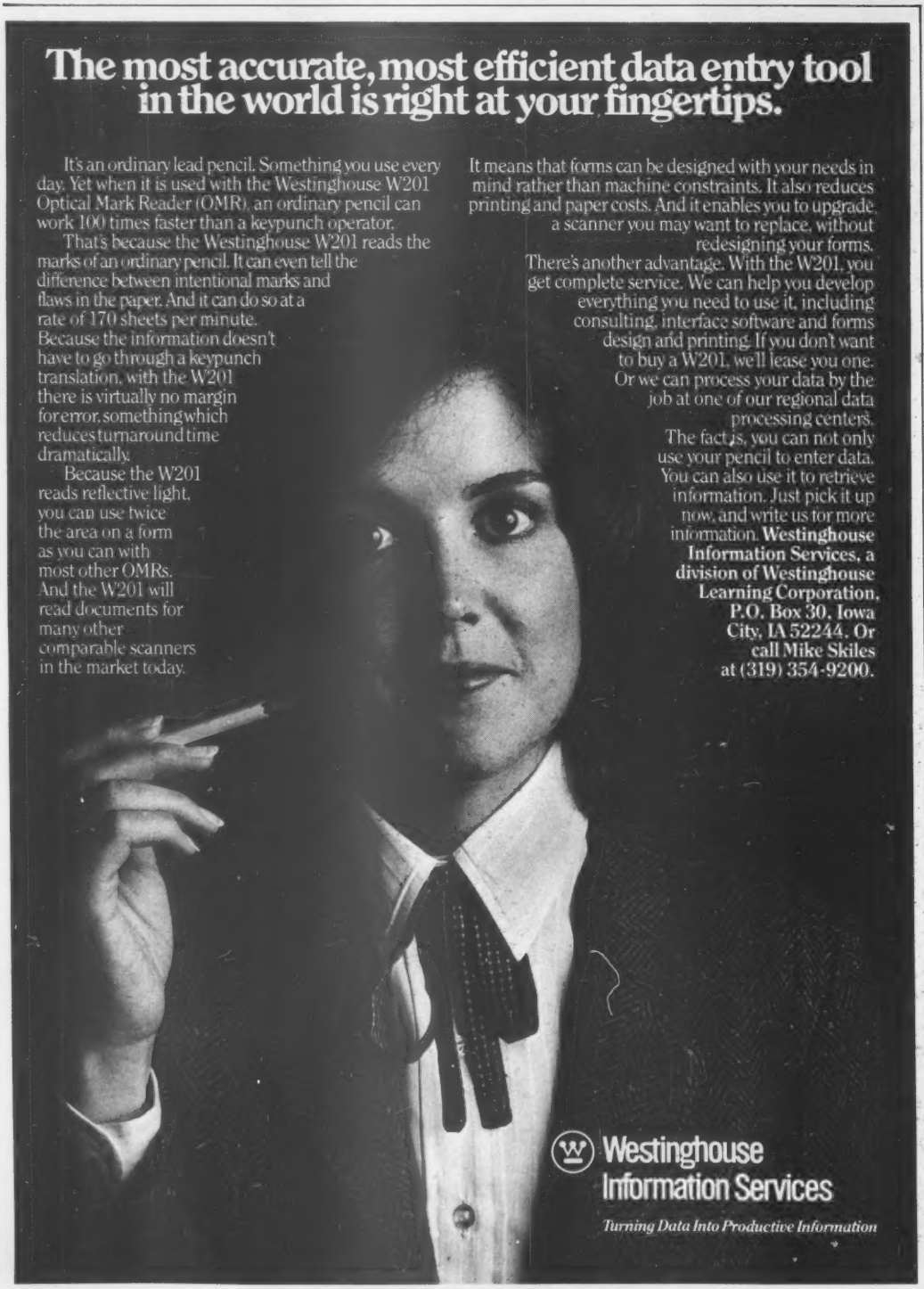

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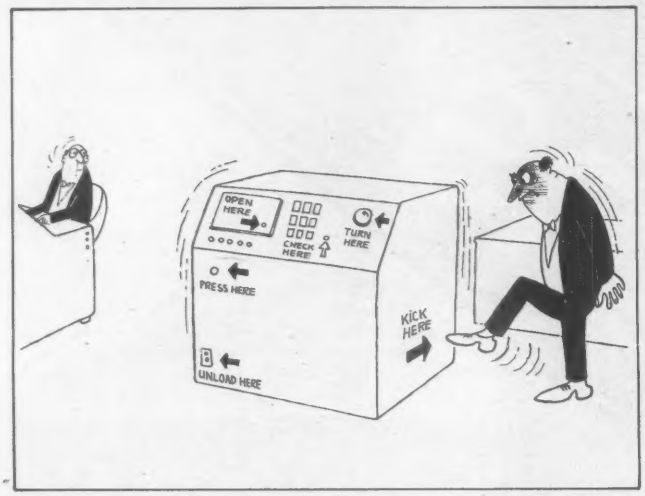

Calendar

May 14, Buffalo, N.Y. — **Solving the Productivity Puzzle: The Engineering of Information Systems.** Contact: Joanne Starr, Computer Task Group, Inc., 800 Delaware Ave., Buffalo, N.Y. 14209.

May 24-25, Washington, D.C. — **Aerospace & Defense Computer Conferences.** Contact: Technology Training Corp., P.O. Box 91295, 5959 W. Century Blvd., Los Angeles, Calif. 90009.

May 24-26, Washington, D.C. — **X.25.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

May 25, Boston — **Mabra (Record Administration System).** Contact: I.P. Sharp Associates, Inc., 1200 First Federal Plaza, Rochester, N.Y. 14614.

May 25-26, New York — **Local-Area Network.** Contact: Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

May 25-26, Philadelphia — **Packet-Switched Public Data Networks.** Contact: Priscilla Goudreault, Education Coordinator, Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

May 25-27, Andover, Mass. — **Advances in Document Storage and Retrieval.** Contact: Institute for Graphic Communication, Inc., 375 Commonwealth Ave., 4th Floor, Boston, Mass. 02115.

May 25-27, Boston — **Electro/82 Show and Convention.** Contact: Electronic Conventions, Inc., 999 N. Sepulveda Blvd., El Segundo, Calif. 90245.

May 25-28, Denver — **Project Management.** Contact: Bill Schoonmaker, BSI, 4720 Montgomery Lane, Bethesda, Md. 20814.

May 26, Rochester, N.Y. — **Sharp APL for Business Application.** Contact: I.P. Sharp Associates, Inc., 1200 First Federal Plaza, Rochester, N.Y. 14614.

May 26, Los Angeles, — **Oil Seminar.** Contact: I.P. Sharp Associates, Inc., 1200 First Federal Plaza, Rochester, N.Y. 14614.

May 26-27, New York — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

May 26-27, Boston — **Managing Systems Development Structured Approach.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011. Also being held in Seattle, Wash., May 26-27.

May 26-28, Philadelphia — **Data Base Design.** Contact: Priscilla Goudreault, Education Coordinator, Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

May 27-28, King of Prussia, Pa. — **Digital PABX.** Contact: American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

May 27-28, Valley Forge, Pa. — **Advanced Disaster Recovery Planning.** Contact: Devlin Associates, Inc., suite 795, 1150 First Ave., King of Prussia, Pa. 19406.

June 1-2, Boston — **Managing Documentation & Documentation Standards.** Contact: Carnegie Press Center for Documentation Resources, 100 Kings Road, Madison, N.J. 07940.

June 1-3, Boston — **Project Management and Control.** Contact: Priscilla Goudreault, Education Coordinator, Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

June 1-3, Teaneck, N.J. — **Data Base Fundamentals.** Contact: Priscilla Goudreault, Education Coordinator, Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

June 2, Boston — **North-East Computer Measurement Group.** Contact: Sherienne Rist, BGS Systems, Inc., One University Office Park, Waltham, Mass. 02254.

June 2-3, Pittsburgh, Pa. — **Pittsburgh Business Systems Show.** Contact: Pittsburgh Business Systems Show, Show Management, Shea Management, Inc., 1326 Freeport Road, Pittsburgh, Pa. 15238.

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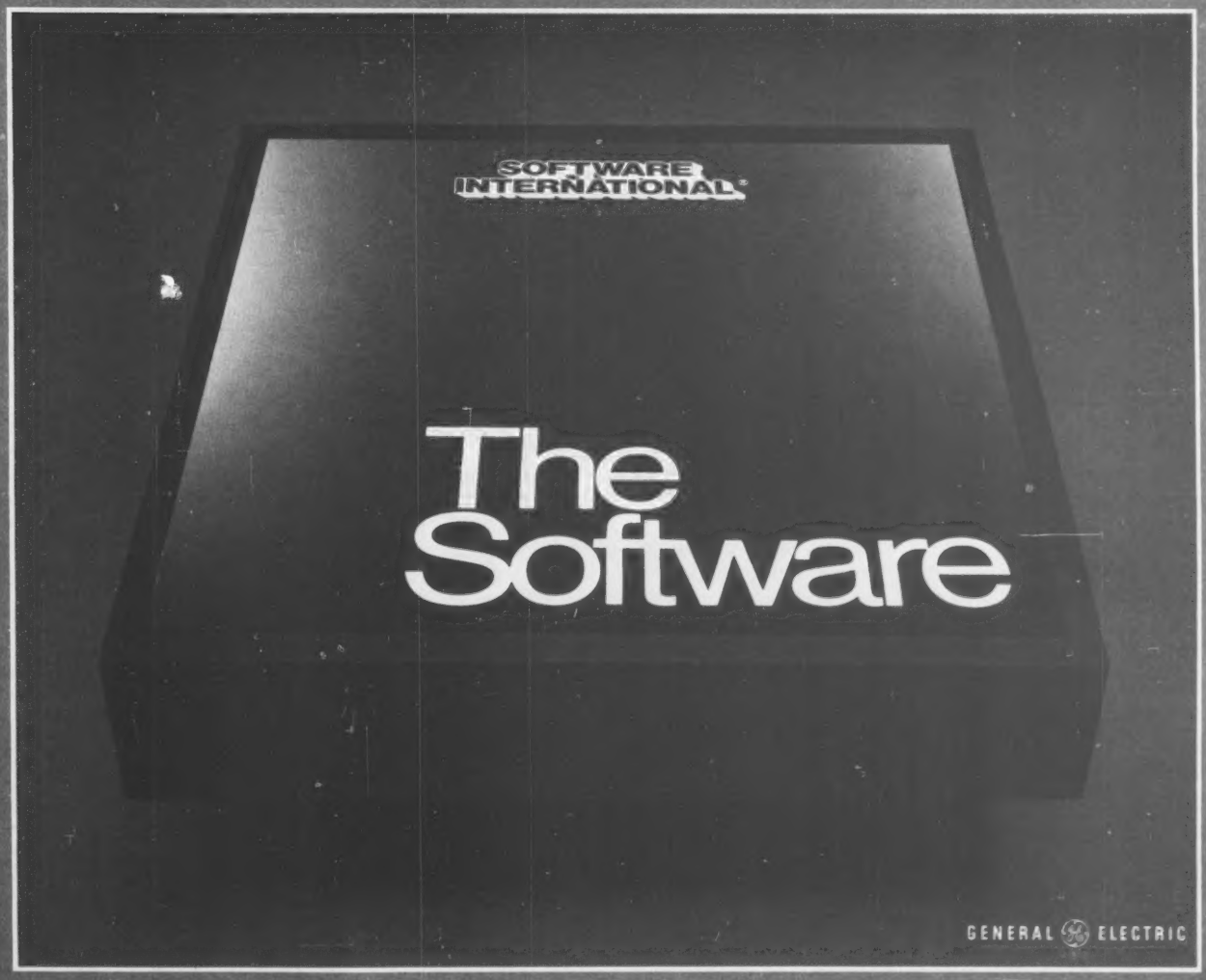

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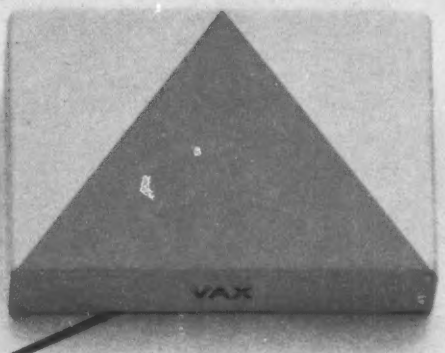

By now, everyone understands the need for standard communications protocols. Without them, an electronic Tower of Babel would surely ensue. But there have to be different standards for different networks. A local-area network is different from a wide-area network. A public network is different from a private one.

No single universal standard has emerged. Nor is one likely to. There are simply too many diverse networking environments, each fulfilling specific, mutually exclusive needs.

That's why Digital is committed to supporting and, in fact, actively promoting the more important standards now surfacing in the various environments.

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When we first developed our networking architecture, we understood the need for flexibility. We consciously adopted an architectural strategy that would allow our networking software to work freely with a wide range of protocols, including some that didn't even exist at the time.

The success of that strategy is now becoming apparent. As more vendors enter the networking field, Digital is uniquely positioned to offer compatibility with the emerging protocols. We've gone farther than anyone to assure that your options are open.

X.25 and other public networks.

Digital offers the X.25 protocol for use with public packet-switched networks such as Datapac (Canada), Transpac (France), and PSS (U.K.).

But when used with our computers, X.25 is much more than a simple link. We can provide you with the higher-level protocols that will take your systems beyond mere communications and into the sophisticated functionality that has made us a leader in networking software.

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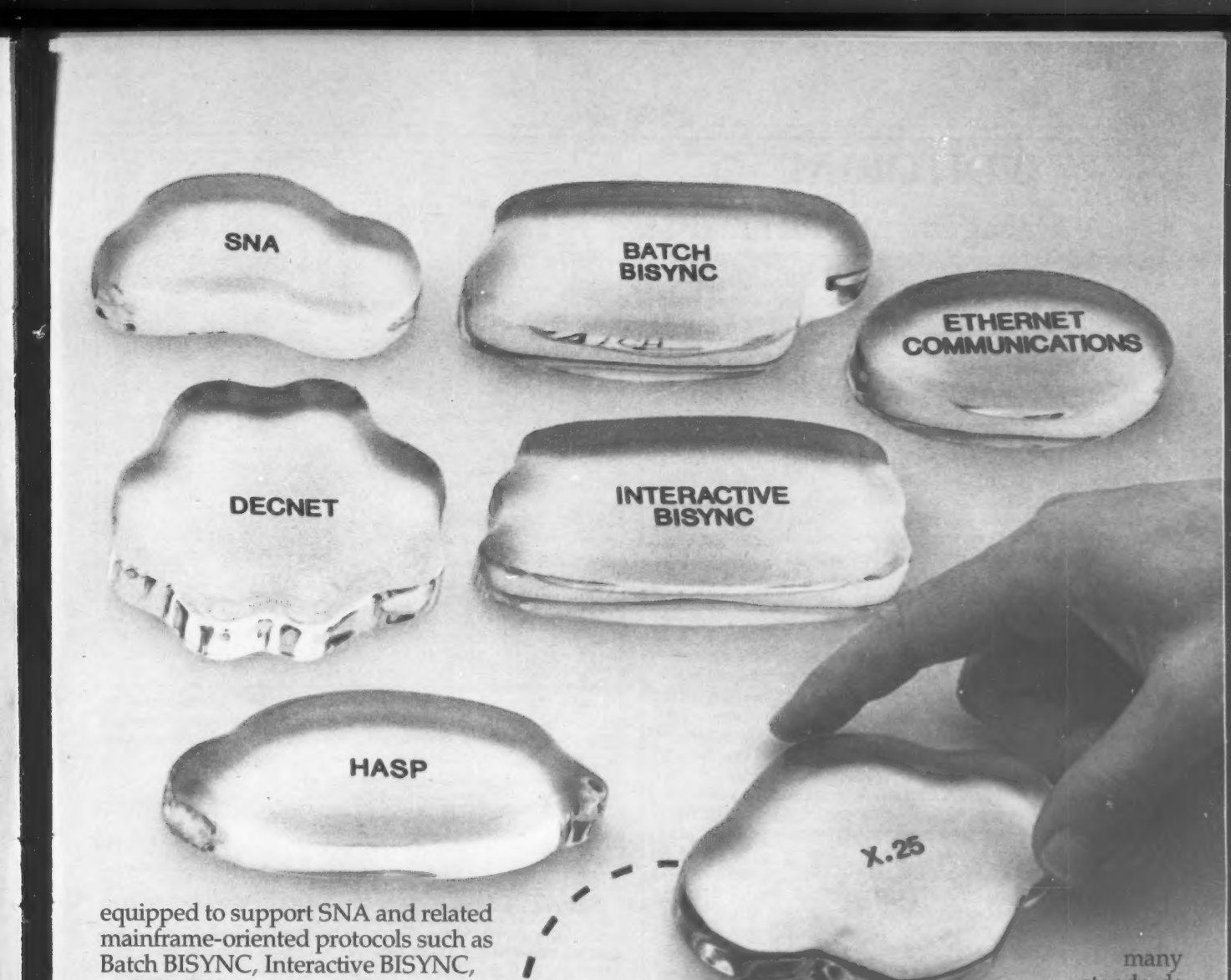

equipped to support SNA and related mainframe-oriented protocols such as Batch BISYNC, Interactive BISYNC, and HASP.

Local-area networks.

Digital is one of the original sponsors of the Ethernet™* specification that has been adopted by a number of computer, semiconductor, and office equipment manufacturers. We recognized early on the need for highly reliable local-area networks. We were in on the ground floor of the definition, development and, now, the implementation of the Ethernet specification.

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And so on.

We have listed a few of the many standards we are currently supporting. There are more. But even more important than the number of protocols is the attitude we have toward them. We are determined to help you meet any kind of networking objective. And our capabilities in that regard are as far-reaching as they are farsighted. So if you're planning a network, don't make the mistake of planning just for the present. Talk to the people who can meet your current needs and still keep your options open for the future. Talk to us.

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EDITORIAL

A Management Dilemma

DP conference speakers in recent months have identified a dilemma besetting many organizations across the country: DP managers are hot properties in the current job market, but may actually be doomed to failure within two years of being hired.

The dilemma arises because top management and end users form unrealistic expectations of what DP departments can deliver, conference speakers have told DP professionals.

A number of companies have tried to resolve this dilemma by establishing "information centers" that mediate relations between end users and DP specialists and also educate end users in the limits and potentials of DP while developing DPer sensitivity to end-user problems and objectives.

Over the past few years, many user organizations have instituted "participative" implementation strategies whereby all-important systems development projects require both end-user participation in the design process and extensive review by end users of each implementation phase.

In terms of real-life corporate behavior (rather than management school rhetoric), the very concept behind the management information systems manager seems to entail both consolidation of control over information processing throughout the organization and mediation of the interests of end users and DPers alike [CW, Dec. 28, 1981/Jan. 4, 1982]. Nevertheless, the DP or MIS department has an adversary relationship with end users in many organizations, and top management frets over its enormous fiscal investment in such departments, especially as the nation's economic stagnancy continues.

The advent of office-oriented personal computers marks a new era in relations between end users and the DP department. As these devices become as ubiquitous as office workstations, DP managers should prepare for changes in end-user expectations, as well as for changes in top management's willingness to expand investments in DP departments.

The dilemma before the organization could rapidly vanish if end users find they can obtain immediate resolution of most information processing needs and, as a result, come to depend less on resources in the DP manager's custody. Such a scenario would leave the DP manager as steward of a backbone utility — still critical to the organization, but taken as much for granted by end users as electricity, water and the lunchtime catering truck.

Besides the proliferation of office-oriented personal computers that offer price/performance levels comparable to the IBM 3279 intelligent terminal, the widening availability of vended on-line information services and software packages that replace the need for applications programmers could make this scenario commonplace in many companies toward the end of this decade.

DATA PAST

Five Years Ago
May 16, 1977

PALO ALTO, Calif. — Hewlett-Packard Co. introduced a communications software product that reportedly allowed any terminal tied to one HP 3000 minicomputer to access and process data on another 3000 in a data communications network.

The DS/3000 made it possible to use HP 3000 Series II systems on-line in a distributed processing network, the firm said.

Ten Years Ago
May 3, 1972

MINNEAPOLIS — An IBM 1403 printer and all its capabilities, including interchangeable print chains, could be used on a Sperry Univac 1108 through hardware and software developed by United Software Co.

The 1108 was limited to Model 758 or 768 drum printers. The latter provided a choice of type fonts but the drums had to be installed by Univac.

'To my millions of loyal and devoted stockholders: Take and send a letter — "To the House Telecommunications Subcommittee: I strongly protest the Communications Rewrite Bill because of its unfairness, cruelty, viciousness, deception, depravity, debauchery, injustice, iniquity, bias, dishonesty, prejudice . . . "'

LETTERS

System Documentation

P. Howard Patrick makes several good points in "System Documentation: Provide It Early" [CW, April 15]. However, as an experienced technical writer I must take exception to two points in the article.

First, Patrick asserts that documentors (I assume he means software technical writers) must have programming knowledge and cites some reasons.

Most technical writers do have some programming experience or training. But writers may be asked to document systems written in a wide variety of languages, from assembler to APL.

Knowledge of programming techniques enables the writer to understand the theory of the software's operation. Only when a program has gone undocumented for years would it be necessary to "get down" into the code to prepare manuals. Software vendors should avoid this inefficient use of a writer's skills at all costs.

This point brings up the second issue: time. The article states that poor quality programming extends document writing time. To be sure, patchwork or "fluky" programs create time-consuming documentation projects.

Nevertheless, the factors most affecting the time needed to complete user documents are:

- The complexity of the software.
- The technical sophistication of the intended user.
- The number of operations to be performed by the user.
- The availability of a product specification.
- The cooperation of the programming staff associated with the product.

Worst-case situations easily develop into documentation efforts of a year's time or more.

These two realities of the documentation world underscore the importance of treating documentation as a top priority item in the software industry.

Diego Gonzalez
Technical Writer
West Newton, Mass.

Cash Management

Ray Dicasali's In Depth article "Cash Management" [CW, April 5] is impressive in its perspective, but does not meet the immediate and practical problems that confront corporate cash managers daily. Cash managers need immediate processing of data into decision-information reports that allow for maximum control and minimum borrowings.

Cash management is a daily time-critical function that often involves high opportunity costs. For example, we recently worked with a company that left millions of unused collected dollars in its banks nightly.

By automating its cash management information system, the resulting increase in investments made a significant contribution to the profit and loss.

Dicasali may have the right goals for the game plan, but a modest beginning of computerizing the Treasury Department's cash management function can achieve immediate results.

Robert Wills
President
Wills-Van den Bergh, Inc.
San Bruno, Calif.

GETTING AHEAD IN DP/Donald J. Berardo‡

Handling a Back-Stabber in a Meeting

It's an important meeting, with users and management from outside your DP department. As manager, you are making a proposal to the group. Suddenly, an employee from your department who has accompanied you to the meeting unexpectedly raises an objection and proceeds to attack your proposal.

What would you do?

First, do *not* lose control and blast the person right there. Though it may be humiliating to sit and listen, you will make a worse impression by taking the subordinate's remarks personally and counterattacking. Stay calm and relaxed.

If possible, pretend it didn't happen at all. If you can ignore the outburst and continue with your proposal, you will show that you are still in control of the situation and still in control of your employee.

After the meeting, you must do a number of things. First, reconsider what was said — is there any truth in it? However, even if the employee's objections have merit, there's a more important issue involved, one which requires having a serious talk with the person.

Let the employee know that you were displeased with his conduct in the meeting. Explain that, politically, it was a poor move that put both of you in a bad position. It looked to the other members of the group as if the two of you weren't communicating — which suggested a fault that should not exist in the first place and one that certainly shouldn't be demonstrated to outsiders in an important meeting.

Explain how the objection undercut what you were trying to accomplish, weakening your position and opening the door to other objections.

Meet Beforehand

Suggest that from now on the two of you should meet privately before each meeting to discuss any problems or possible disagreements.

Impress upon the employee the need to let you know beforehand of any objections he might want to make in the meeting. In some cases, you will want to tell the employee not to voice the disagreements at all.

Occasionally, you may choose to inform the group of your employee's objections by saying: "This is my position. John dissents for such and such reasons, which I have chosen to override."

Whether or not you do this will depend upon the group with whom you are meeting and its attitude toward your project. Don't introduce objections that could make your position vulnerable to divide and conquer strategies.

The point is that you, as manager, must be the one to decide how and when to introduce your employee's objections.

Tell your employee that if an unexpected issue comes up in a meeting and he disagrees with your position, he should wait until later to register his objections.

Let him know that you want to hear his opinion — but privately. You want to encourage constructive criticism, but not in public meetings. Ask the employee how he would feel if you dressed him down in front of a group.

Tell the employee that such public disagreements harm him in a couple of ways. First, he demonstrates his political naivete and risks making enemies.

Suggest that he increase his corporate savvy by modeling himself on his superiors.

Second, inform him frankly that you cannot permit such insubordination and that in the future such outbursts could threaten his position in your department.

Make it clear that there are proper and improper places in which to bring up disagreements and that, as manager, you have the final say because you have the final responsibility. Remember the following guidelines:

- Stay calm.
- Express your displeasure to the employee in private.
- Meet with the employee before meetings.
- Explain the political danger of such outbursts.

Berardo is a management counselor and career therapist. He is a vice-president with the Meld Group in Newington, Conn., publishers of a monthly newsletter on management development.

HUMAN CONNECTION/Jack Stone‡

Data Center Manager Much Maligned

This is Part 1 of a continuing series on how to succeed as a data center manager.

Ah, success! That sweet mystery of data center managers' lives.

Though widely recognized, if not secretly admired, for their seemingly mystical ability to tame history's most complex technology for society's well-being, the vast majority of these managers are unexpectedly downtrodden, harried, burdened, self-doubting and, in a few cases, paranoid.

Can you recall when you last saw a data center manager who projected the image of success? Or one who wore the luster of leadership? Or one who was the paragon of performance or the carrier of confidence?

And all this in spite of the munificent, unceasing downpourings of men, machines and money from executive offices into the centers to help quell the overwhelming demands for systems services. Yet data center managers continue to cringe from executive carping about deliveries of urgently needed systems in years remote.

Managers and Miracles

Managers have performed wonders in moving their smart, bright young staffs way up the pay scales. Their chests burst with pride as the smartest, brightest, youngest programmer is promoted and slides gracefully into an analyst's slot. Then their teeth gnash with fury when the creep leaves three months later for a better paying job.

The cleanup of operations management has led to incredible records of better than 95% uptime on the bully mainframe. But management's feelings of technical achievement quickly dissolve when on-line users unite in their hollerings about a rare outage.

And, on the subject of those users, how often have the centers literally slaved for them, for so little appreciation. Managers' hearts pound for joy when — after half the staff works round-the-clock for three fun-filled days and four glorious nights solving systems problems — the output from a major application is delivered to the production counter.

But their eyes gush with tears when the user telephones to say, "I'm sort of tied up. Would it be OK if I stopped by for it one day next week?"

Hey, if this is such a glorious electronic business world we live in and data center managers are the exalted gurus who control the machines at the hub of it all — or better stated, toss around the electronic brains like kids playing tiddledywinks with sewer lids — then why the hell are there so many unhappy DP managers?

Why do these managers, in spite of all their expertise, deserve the dubious distinction of probably having the highest turnover rate of any professional classification around? Why do top executives continue to treat their DP departments as if they were leper colonies? Why are there so many DP management Rodney Dan-

(Continued on Page 33)

READER COMMENTARY/James W. Nass‡

Data May Be Dangerous To Your Behavior

Never before in history has so much information been available so quickly to managers about their own businesses. In the next few years the capability will exist to produce even more information in an even shorter time.

Companies that were always thought to be too small to justify a computerized information system now have one, and even more companies are adding systems every year. With so much more information available, we should be seeing improved performance and more understanding of company goals, objectives and measurements.

It would seem logical that managers would embrace the new information systems and anxiously await each new piece of equipment or new computer program. But with the exception of information system and DP professionals, this is not generally the case among managers, particularly those with line responsibilities.

We are constantly hearing complaints about data overload, poorly conceived and designed systems and the increasing power of organizations that have the responsibility for information systems decisions that line managers think of as their own.

Fundamentally, the problem lies with our inability to fully understand what an information system is and what it does to managers throughout an organization in terms of their behavior.

Information systems must be understood as control systems — no matter what else they may be. The decision on what information to collect, how to display that information, who gets to see the information and what pieces of information correlate with others produces a certain behavior on the part of managers in the organization. Whether this behavior is the behavior desired by senior management and whether it is functional are other questions.

Impact on Managerial Behavior

Even in those organizations where great care has been taken to insure that the users of the information are the ones who determine the information requirements, very little, if any, effort is made to determine the impact of the information itself on managerial behavior.

Often a decision will be made that a certain kind of information is needed at the headquarters or division level. The information specialists will see to it that the information is collected and may decide how it can be displayed and on what frequency. Everyone with an interest in the subject will probably receive the reports.

Some time later a manager or group of managers will begin behaving in a certain way solely because of the information collected, displayed and distributed. The behavior may be dysfunctional and no one will know why it is taking place, including the manager exhibiting the behavior. It may be attributed to incompetence, resistance, uncooperativeness or a host of other reasons.

Data is powerful. The question is not simply do we need the data, but also can we use the data and can it be

(Continued on Page 33)

LETTERS

Cost of Cobol Conversion

The publication of yet another letter from a Cobol user decrying the new Cobol standard [CW, April 19] has prompted me to reply. I have yet to see an explanation from Travelers Insurance Co. Vice-President Joseph T. Brophy or his fellow "travelers" of why mechanical conversion aids cannot be used to reduce the cost of conversion to reasonable proportions.

For example, uses of the ALTER verb can be detected and replaced by appropriate switches and GOTOs with the DEPENDING phrase. This and other similar transformations are purely algorithmic, and it is not difficult to construct a program that can carry them out.

The complaints about high conversion costs remind me of the typical industrial response to the demand for controls on pollution. The cost estimates are widely inflated and there is nobody around to verify them. Once the controls are in place, it turns out that the actual costs are a fraction of the estimated costs.

I imagine that if Brophy were to let a contract for the conversion at his estimated cost and then have to explain to the Travelers' stockholders why the contractor made such an enormous profit he would be more than slightly embarrassed.

Cobol can move ahead or remain mired in the past. Living in the past is not cost-free. It is now common knowledge that program maintenance costs generally exceed program development costs.

Ultimately, retention of the ALTER verb and similar antiquities will cost far more than getting rid of them, just because programs that use those constructs are so dreadfully hard to maintain.

Paul W. Abrahams
Consulting Computer Scientist
Deerfield, Mass.

Key Issues in DP Training

I was pleased to see the space devoted to the area of DP training "DP Training: Multimedia Aids" [CW, Feb. 8].

Unfortunately, as John W. Rose points out in his letter to the editor [CW, March 8], much has been overlooked in the way of key issues.

Rose contends that classroom vs. self-study is *the* key issue. Elsewhere, others seem to think that "learner-controlled instruction" is the issue (Cox, *Training and Development Journal*, March 1982).

Is the key issue classroom vs. independent study? And within independent study, is computer-based training the answer? What instructional method is best? The majority of debate seems to revolve around instructional media selection. Is this where the answer lies? I think not.

For learning to occur, five basic conditions must be present: meaningful application, manageable tasks, examples of expected performance, opportunities for practice and knowledge of results.

Vendors as manufacturers tend to produce and promote a single medium. This is not surprising since this is the most cost-effective way to manufacture something. (Detroit has been doing it since Henry Ford.)

But in training, we manufacture students with skills, and unless we identify what those skills are, up-front and in detail, we will continue to argue about the media without any basis for justification of selection except cost and convenience.

Charles L. Geigner
Senior Training Coordinator
State Farm Fire and Casualty Co.
Bloomington, Ill.

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Behavioral Effect of Data

(Continued from Page 31)

obtained. The question must always include what kind of behavior will the collection and display of the data be most likely to produce on the part of managers throughout the company.

If the answer is that unwanted or dysfunctional behavior may occur, then alternative data or alternative ways of displaying the data must be found. Often the solution will be to very carefully limit the people who will get to see and act upon the data. If solutions cannot be found, we may be better off without the data.

The information system can become the most powerful communications system in the organization. If company policy or direction changes in a particular area and the information system stays the same, most managers will tend to behave as before no matter how the change in policy or direction is communicated.

The information system must be consistent with the policies and goals of the organization. If company policy is for divisional offices to stay out of the day-to-day operations of local plants and only worry about the bottom line, then we cannot give that divisional office information about day-to-day performance in the local plant. To do so will virtually ensure that the divisional office violates company policy.

If a company adopts a zero-base budgeting system, it cannot continue to report performance against the same period last year and expect managers to fully embrace the new system. This is not to say that a small number of key executives should not continue to look at this information. The growth of computerized information systems poses a danger to managerial performance. This danger is caused not so much by the usually identified problems of too much time spent on paperwork and analysis of the past or too many reports or inaccurate data, but because information itself — the way it is displayed and who gets to see it — all produce managerial behavior. We have not done a very good job of building that fact into our information systems.

Nass is president of James Nass Associates, a management consulting firm based in Fairfax, Va.

Success in DP

(Continued from Page 31)

gerfields who are not treated with respect? What in heaven's name has gone wrong with the data center manager's job?

Well, at the risk of being brazen, I've got some first-rate answers to these questions. However, as a former data center manager I couldn't fathom the job either. Instead, my recently found knowledge derives from a remarkably successful data center operation at Catholic University of America (CUA) in Washington, D.C.

For the record, the CUA center has a large-scale system installed to serve campuswide needs, and its leadership faces all the traditional challenges involved in trying to manage it, plus new ones derived from the current recession.

I originally learned about CUA several years ago during a telephone call initiated by Stephen Roberts, the center's assistant director for systems and programming, who wanted to respond to my weary writings about marginal productivity among programming groups.

Unabashedly, he claimed that his staff was unusually effective. In answer to my cynical question, "Can you give me one, just one, indication to prove your contention?" he stated: "Would you believe that we work the regular hours of nine to five to complete our systems tasks, the same hours as our users?"

I was flabbergasted. "You've got to be kidding!" I responded.

Letters to Stone should be addressed to him at Box 270, 1377 K St. N.W., Washington, D.C. 20005.

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Generator Fits Burroughs B1000 Running on MCP

DETROIT — Burroughs Corp. has unveiled an application generator called Linc for users of its B1000 small business systems running under the MCP operating system.

At the same time, the vendor announced a new system called The Business Partner, which is a combination of the B1000 CPU and the Linc software.

Linc is described by the vendor as a total system generator that takes high-level specifications in the Linc definition language and generates Ansi-74 Cobol programs for the application solutions, Burroughs' Data Management System II for the data base and its Generalized Message Control System for transaction management.

The Linc package reportedly is based on Burroughs standard system software and has full source-level compatibility. It currently is available for the B1000 system and is geared for use in distributed processing networks, according to the vendor.

An unlimited-term license for Linc is available for between $75,000 (for B1000 class systems) and $200,000 (when it is made available for medium and large Burroughs systems).

The Business Partner consists of an enhanced B1000 class CPU with 1M bytes of memory, the software to support Linc and Linc itself. It reportedly provides an upgrade path for users of smaller Burroughs systems and is designed for use in distributed processing networks and for prototyping. Business Partner costs $180,000, the vendor said.

Burroughs Corp. is headquartered at 1 Burroughs Place, Detroit, Mich. 48232.

Intel Users Group Explores Role of Data Base Specialist

GALVESTON, Texas — What is the role of the data base specialist?

In a paper recently presented before the Association of (Intel Corp.) System 2000 Users for Technical Exchange, Patrick McGraw of the University of Texas Medical Branch at Galveston attempted to define the data base specialist's role from an organizational standpoint.

McGraw, who is the associate dean for administration in the School of Allied Health Science here, began by noting that as of August 1981, fewer than 10% of all companies using computers reported having data base management systems (DBMS) in place. By 1990, this figure is expected to change to 90%. Of the organizations having DBMS, only 28% have a data base specialist function, he continued.

The major role of this position is to allow the end user to deal with data in abstract terms rather than as it is stored on the computer and to educate the end users, he explained. "The data base specialist is also responsible for security of the system, for integrity of the system, synchronization of the system, crash protection and recovery."

Three Types of Roles

As this data base specialist function evolves, McGraw said, it is broken down into three types of roles. The first is the data technician role, which is concerned with general operation-level areas. The second role, that of data base administrator, involves the design phase of the data base. The data administrator, the third role, is a higher management staff position, which sets policy and plans overall models for the general data base operation of the organization.

There is a data base management continuum, he explained, with one end emerging from the gray area where the responsibility for software and hardware end and the management of the information on that hardware and software begins. The other end of the continuum stops where the pure end-user functions begin.

"On this continuum resides all the types of data base specialists we have referenced above. Degrees of end-user participation in the data base application range from heavy programming application to providing specific information to the entry of a single-string name to providing one specific piece of information," McGraw said.

Data Base Specialist

From the data base management continuum there emerges a type of individual who can be classed as a data base specialist/user, and this person is responsible both for using the data stored in a DBMS and for maintaining the DBMS itself.

These specialist/users tend to be isolated from any centralized system, he explained, and often are required to plan an information collection system; design, test and implement a data base; design reports; load and update the data base; maintain system integrity and control; and utilize the data that may be generated from the system.

"It is extremely important to introduce these individuals to the concept of information resource management [IRM]," he said, defining this as the realization that the information housed within an organization is its property and, in fact, a valuable asset of the organization.

Unique Opportunity

The specialist/users have the unique opportunity to take a leadership role in fostering the concepts of IRM within the organization, McGraw said.

"It is important to take this responsibility now," he advised, suggesting they begin by sharing data within the organization, trying to institute standardized formats and definitions while developing a new data base, keeping current on the development of sound data base procedures, recording data to develop an inventory methodology (data dictionary) and stressing how valuable the data resources of the organization are.

As McGraw sees it, these actions and attitudes will put data specialists in a position to provide real leadership when the organization begins to take steps to bring its newfound resources under control.

'Titan' Manufacturing Software Fits IBM 370, Series 30, 4300 Under CICS/VS

EDEN PRAIRIE, Minn. — A group of software packages for IBM 370, Series 30, 4300 and compatible mainframes running under the CICS/VS operating system are available from Delphi Data Systems, Inc.

Collectively called Titan, the packages were designed for use by manufacturing and distribution companies to improve communication between such company functions as production planning, purchasing, accounts receivable and accounts payable, the vendor said. They reportedly provide the tools needed to follow up on sales prospects and to manage marketing organizations.

Applications systems included as part of the Titan group provide inventory, net change material requirement planning, bills of material, shop floor control, master scheduling, manufacturing costing, capacity planning and routings. Prices for Titan range from $25,000 to $30,000/package, which includes training, documentation and standard customization, from Delphi Data Systems at 9905 Hamilton Road, Eden Prairie, Minn. 55344.

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'Facts' Runs on IBM Mainframes

VIENNA, Va. — The Financial Accounting System (Facts) package for IBM MFT, MVT, VS1, VS2, MVS and SVS operating systems running on IBM 360, 370, 30 series and 4300 systems has been released by the Boeing Computer Services Co.

Facts is a generalized system for financial accounting and reporting of data processing activities, the vendor said. The package is said to identify users of data processing resources and services and then compute the charges for these services.

Facts is said to include the ability to track charges at organizational, project and subproject levels. The package can report both computer charges, batch and on-line and non-computer charges, according to the vendor. It is table-driven and supports user interface by making a variety of user exits available.

According to a vendor spokesman, Facts-supported features include establishing both a cost and a price value for resource usage. Cost coefficients can be used to reflect the cost to deliver the resource or service; price coefficients can reflect charging consideration such as urgency, time-of-day and day-of-week of execution and user. Also available within Facts is an automatic ability to reallocate charges to selected users to insure full zero balancing of accrued charges vs. data center costs, the vendor said.

Prices for the Facts package range from $8,000 to $15,000, depending on package options selected, the vendor said.

Further information is available from the Program Products Division, 7980 Gallows Court, Vienna, Va. 22180.

Software Ties Two Systems From Johnson

McLEAN, Va. — A Workload Management System has been developed by Johnson Systems, Inc. Compatible with IBM 370, 30 series and 4300 systems, the software reportedly ties production control information from Johnson's Automated Planning and Execution Control (Apex) system with the resource management facilities of its Job Accounting Report System.

The software provides a single source of data center management information, combining the planning and execution information from Apex and Systems Management Facilities data from IBM's OS, according to the vendor.

The software is priced at $5,000. For the next three months, however, the cost will be $2,500, a spokeswoman said from 8300 Greensboro Drive, McLean, Va. 22102.

Package Formats Free-Form Input

MINNEAPOLIS — B.I. Moyle Associates, Inc. has announced Bimtext, a package that creates formatted documents from free-form input on systems running under IBM's DOS/VSE operating system.

The package performs margin justification, page skipping and other formatting. Changes can be made to documents without retyping the text.

Other features include uppercase and lowercase printing, automatic generation of a table of contents and index, page numbering and partial document printing, the vendor said.

The package costs $2,400. It can be leased for $1,200/year or $120/mo, B.I. Moyle said from 4355 Lyndale Ave. S., Minneapolis, Minn. 55409.

Security Package Runs on System/34

CALEDONIA, N.Y. — Systems Associates, Inc. has announced Proc-Secure, a menu-driven security package for IBM's System/34.

The package reportedly allows the user to place procedure, library and user identification information in a master security file. It also allows automatic modification of those procedures to permit access only through the master file, the vendor said.

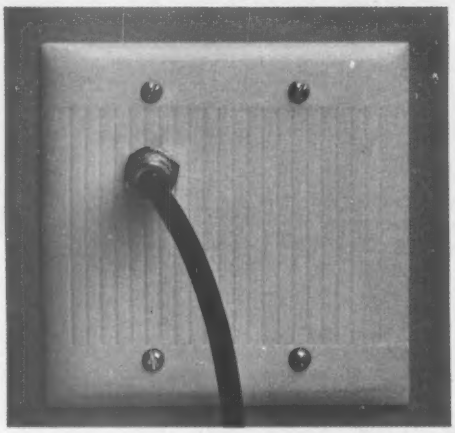
The package costs $95, the vendor said from 3177 Jane St., Caledonia, N.Y. 14423.

'Cops' Package Beefed Up

ATLANTA — American Software, Inc. has announced an enhanced version of its Customer Order Processing System (Cops) for IBM and plug-compatible mainframes using Vsam and CICS.

Enhancement modules are said to provide for "friendly" customer identification, on-line order entry and inquiry with automatic credit checking, on-line allocation of inventory and reconciliation and consolidation of bills of lading, the vendor said.

The system ranges in price from $80,000 to $120,000, depending on features. American Software is located at 443 E. Paces Ferry Road, Atlanta, Ga. 30305.



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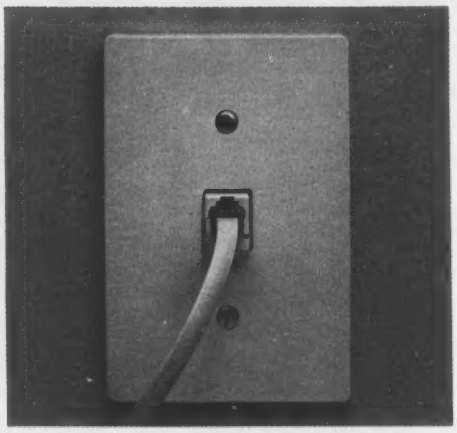

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Interface Out for IBM IMS/VS, CICS/OS/VS Data Bases Using SAS

CARY, N.C. — SAS Institute, Inc. has announced an updated interface to IBM IMS/VS or CICS/OS/VS data bases utilizing SAS software in MVS or VS1 batch or MVS TSO environments.

SAS/IMS-DL/1 is said to enhance programmer productivity by virtue of the claim that as many as 10,000 Cobol statements can be completed "in as few as 10 SAS statements," according to the vendor.

An early release of the product was limited to data base access through a batch IMS/VS region, a company spokesman said. The product currently is said to include a Batch Message Processing interface that supports sequential and random data base access, all DL/1 data base calls, system calls and message queue calls.

Processing options specified by standard IMS Program Specification Blocks determine the kinds of access permitted by SAS/IMS-DL/1 programs.

For corporations and government institutions, the software costs $3,000/year for the first CPU. For degree-granting institutions, the cost is $2,000/year for the first CPU, the vendor said from SAS Circle, Box 8000, Cary, N.C. 27511.

'Xpediter' Extends Support To IBM VM/CMS, OS/VS

SAN JOSE, Calif. — Application Development Systems, Inc. has announced a version of its Xpediter program testing and debugging aid that reportedly extends support to IBM VM/CMS and OS/VS environments.

Xpediter is said to support interactive testing and debugging of subroutines and programs under VM/CMS. The package provides facilities to initialize or modify data anywhere in a program, start and end the test at any location, bypass or simulate the function of parts of programs or subroutines and display program data symbolically at any time, the vendor claimed.

Xpediter reportedly includes a set of testing commands supporting interactive execution of a program or part of a program with different sets of input data.

The software supports IBM's System Productivity Facility (SPF) under TSO and CMS and is said to provide menus for the dynamic allocation of data sets as well as program execution. Xpediter costs $25,000. The VM/CMS support option and the VM/TSO option each cost $2,500.

Other options in the OS/VS environment include support for TSO for $2,500, TSO/SPF for $2,500, IMS/BTS for $5,000 and IMS On-Line Message Region for $5,000.

Application Development Systems is located at 1530 Meridian Ave., San Jose, Calif. 95125.

Utility Permits Data Recovery

COLUMBUS, Ohio — A utility program said to permit the recovery of data from deleted members of partitioned data sets and partially damaged data sets on IBM MVT and MVS systems has been developed by the Polimetrics Lab of Ohio State University.

The program is primarily used to retrieve the "Nth back" deleted version from On-Line Business Systems, Inc. Wylbur and IBM TSO source libraries, according to a company spokesman. The utility may also be used to retrieve any data that has not been physically erased when the directory of a partitioned data set has been destroyed.

The software costs $600, including documentation and sample Wylbur and TSO command procedures. The Polimetrics Lab is located at 154 N. Oval Mall, Columbus, Ohio 43210.

Utility Added To 'Maxximum'

SANTA ANA, Calif. — The Maxximum Restructuring Utility has been added to California Software Products, Inc.'s Maxximum data base management system (DBMS) for users of this software on IBM mainframes; Honeywell, Inc. Level 6 minicomputers; and Gould, Inc. computer systems.

It is intended for engineering and scientific applications areas and supports the traditional data base environments.

Proprietary storage techniques provide quick data operations and fast searches can be done because of an imbedded inverted file, the vendor claimed. The package is written in CSPI Pascal.

The restructuring utility sells separately to existing CSPI data base users for $10,000 to $15,000, and with the DBMS, it costs between $20,000 and $80,000, depending upon configuration and operating system, the vendor said.

California Software Products is based at Suite 300, 525 Cabrillo Park Drive, Santa Ana, Calif. 92701.

When you plan your company's "office of the future," you're faced with a dilemma. The two most basic methods for tying office information devices together — the local network and the advanced voice/data PBX — both have pluses and minuses.

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The advanced PBX is a less expensive way to connect information users, *but* it's not quite as fast as coax which may be a drawback for heavy users.

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The local network and PBX can form one totally integrated system, or stand alone. You can start with whichever system you need now, and add the other later.

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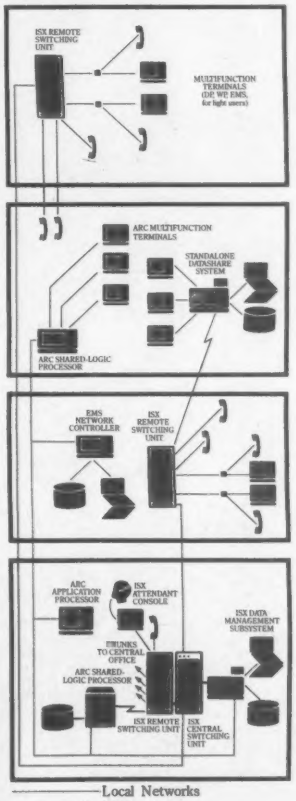
With ARC, workstations, printers, processors, and files are linked together so all resources are available to all users.

You can expand the ARC network in small, inexpensive increments by simply adding more workstations, printers, disk storage, and so forth. Each multifunction workstation can perform word processing, data processing, and electronic message service. And while you expand, you never have to divide up the common, integrated database. Every user can access all the information, except where you impose security controls.



No matter how far you expand your ARC system, you continue to get fast response at every workstation because you can add processing *power* as you expand.

An information switch for the price of a phone switch

The PBX portion of the IEO is the Datapoint Information Switching Exchange or ISX.™ It's an advanced digital PBX that not only connects telephone extensions, but makes connections between computers, word processors, and other digital business machines. It even will let your multiple Datapoint local networks talk to each other quickly and easily.

The ISX gives your lighter data processing users the connections they need to send and receive information, and can tie them into the higher speed ARC network when necessary.

The ISX costs no more than an ordinary voice-only PBX. The building wiring is ordinary telephone wire. So the next time your company needs PBX equipment, you could install the Datapoint ISX instead and lay a foundation for office systems integration without spending any additional money.

You can expand the ISX up to 20,000 ports without ever replacing equipment. It's a fully digital, programmable system that allows you to move extensions and change phone features yourself using simple English-language commands.

The ISX also provides powerful features like a least-cost routing system for long-distance traffic that can slash your phone bills up to 40%.

The most sensible, practical path to office automation

Only Datapoint offers *both* basic methods for integrating office systems. And only Datapoint makes complete computer, word processing, and telephone systems that work together.

The systems in the Datapoint IEO were designed from the very beginning to work together, so you get expandability, flexibility, and compatibility that you probably can't get with a combination of systems from multiple manufacturers.

The Datapoint IEO isn't just a blue-sky idea. It's a working reality that companies can use right now. Let us show it to you. Write for our free brochure: A Capsule Look at Datapoint. Datapoint Corporation, Corporate Communications T41XX, 9725 Datapoint Drive, San Antonio, Texas 78284. Or call us at (512) 699-7059 for the Datapoint sales office nearest you.

DATAPOINT

SYSTEMS THAT WORK TOGETHER NOW

DPPX APL Offers Local-Site Operation of 8100

ATLANTA — IBM has announced a programming language said to enable users of its 8100 system to work with APL on a local 8100 at a remote distributed data processing site.

The 8100, running under the Distributed Processing Programming Executive (DPPX) operating system, allows for use at a local site instead of interacting with host IBM 370 or 4300 systems.

The DPPX APL language enables users to write, debug and execute APL programs from casual to full-size interactive application programs using local data bases, the vendor said.

DPPX APL users can reportedly access screens defined through DPPX Distributed Presentation Services; access data stored in DPPX data sets, DPPX data base and Transaction Management System data bases; execute DPPX commands and interface with programs written in other languages defined to DPPX APL.

The programs must also conform with DPPX linkage conventions, an IBM spokesman noted.

Basic license price for DPPX APL is $2,100 with a $350/mo maintenance fee. For offsite locations, the base license is $1,575 with a $262/mo maintenance charge.

Additional information is available from IBM's National Marketing Division, 4111 Northside Pkwy., Atlanta, Ga. 30327.

'Blast' From Data Systems Runs Under DG's AOS/VS

BATON ROUGE, La. — Data Systems of Baton Rouge has enhanced its Blocked Asynchronous Transmission (Blast) program to run under Data General Corp.'s Advanced Operating System and AOS/VS. The package will now run on any standard DG operating system, Data Systems said.

Blast provides asynchronous transmission at speeds from 300- to 1,200 bit/sec over regular dial-up phones and at speeds up to 9,600 bit/sec between computers directly connected at the same site, the vendor said.

Blast reportedly enables users to simultaneously send and receive any operating system files and programs between any two DG computers with full data integrity, using low-cost asynchronous modems and regular business phones. Programs, patches, data files, revisions, updates and text files can be exchanged and executed providing low-cost diagnostics, remote-site support and remote program installations, the vendor said.

The program licenses for $500 to $800 depending on the CPU and operating system, with a $100 to $250 royalty/subsequent installation.

The vendor is located at 8939 Jefferson Highway, Baton Rouge, La. 70809.

Precision Visuals Tailors Graphics To DG's MV-8000

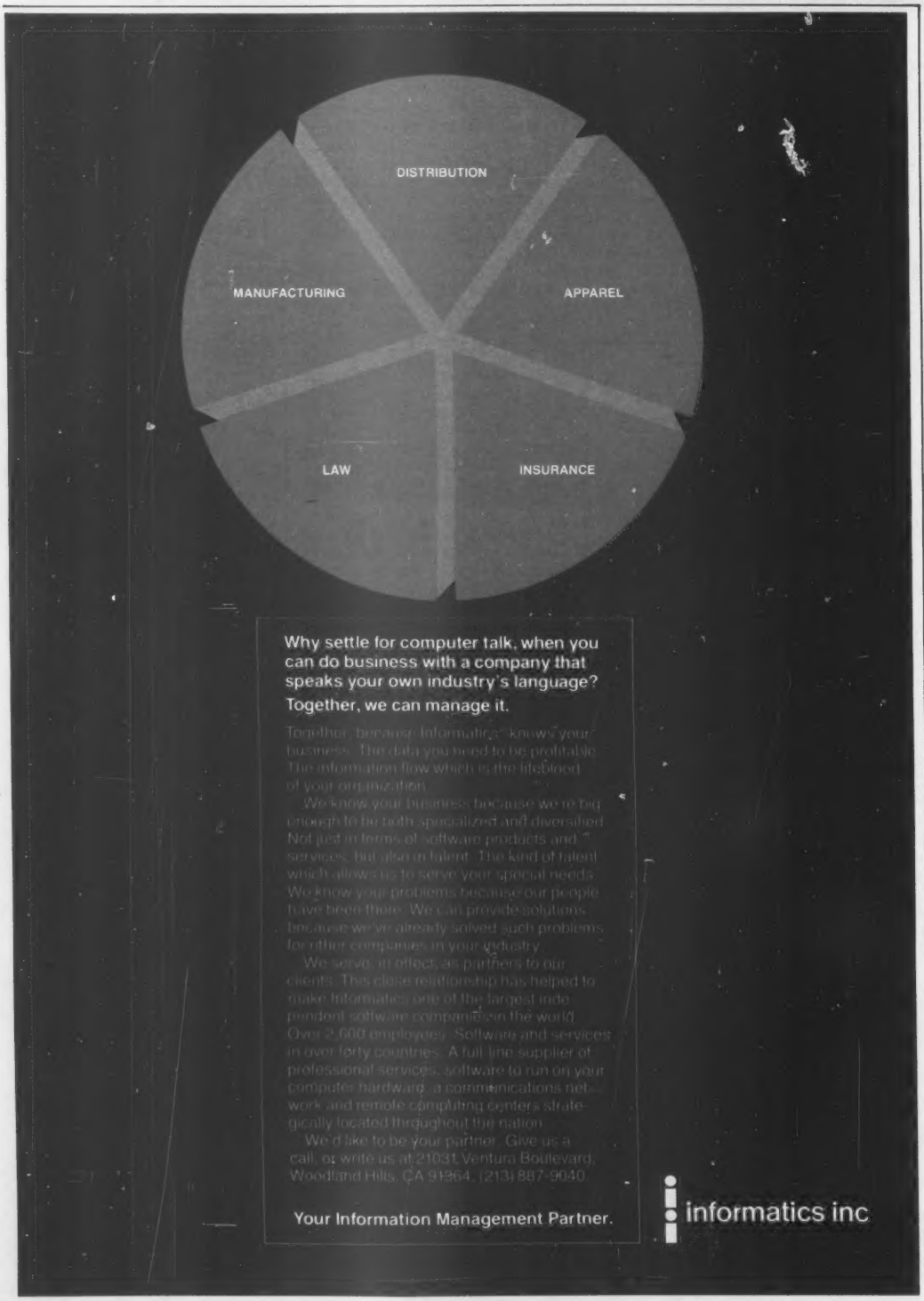
BOULDER, Colo. — Precision Visuals, Inc. has announced that two of its graphics packages have been tailored to run on the Data General Corp. MV-8000 minicomputer system.

The tailored packages are the DI-3000 and Grafmaker. In addition, the firm indicated that it has raised the price of Grafmaker from $4,000 to $6,000, effective June 15.

Written in 1966 Ansi Fortran IV, DI-3000 is an integrated system of 160 user-callable graphics subroutines. Grafmaker operates in conjunction with DI-3000 and comprises user-callable subroutines for producing line graphs, bar graphs and pie charts, the vendor said.

In addition to the DG MV-8000, Grafmaker runs on equipment from IBM, Hewlett-Packard Co. and Digital Equipment Corp.

A perpetual license for DI-3000 starts at $8,000, while a Grafmaker license starts at $4,000 from the vendor, 250 Arapahoe, Boulder, Colo. 80302.



Utility Provides Full-Spool Backup

ATLANTA — A utility package for Digital Equipment Corp. VAX/VMS system users that is said to provide full-spool and incremental backup and to restore capability for disk data files has been announced by Raxco, Inc.

Rabbit-5, operable in a "novice" or "expert" mode, lets users save/restore files by date, save/restore file types with wild-card notation, save/restore files based on actual length in blocks to reduce data storage and exclude/include files when saving or restoring, according to the vendor.

The software is reportedly written in Fortran-IV and macro assembler and will operate under VMS Version 2 and above. Rabbit-5 costs $3,995 or rents for $200/mo from the firm at Suite 200, 6520 Powers Ferry Road, Atlanta, Ga. 30339.

Ledger Package Out for VAX-11s

EVANSVILLE, Ind. — A general ledger and management reporting system for Digital Equipment Corp. VAX-11 computer systems has been announced by Evansville Data Processing Corp.

Able is an enhanced version of the package that was introduced by the vendor for the DEC PDP-11 in 1964. It reportedly features unrestricted analysis and reporting formats.

The software costs $15,500, according to the vendor at 1010 S. Weinbach Ave., Evansville, Ind. 47714.

Cullinane Establishes District Support Sites

WESTWOOD, Mass. — Cullinane Database Systems, Inc. has established four district support centers — in Atlanta, Philadelphia, Chicago and Los Angeles — to provide local support facilities for users.

Each district support center is online with the firm's Technical Support Information System (Tsis), an automated customer information management system designed for control of support services, a company spokesman explained.

Tsis links directly into Cullinane's customer data base, and all support activities are centrally coordinated with the staff here to supply reserve support where needed, a company spokesman said.

More information is available from Cullinane, 400 Blue Hill Drive, Westwood, Mass. 02090.

Project Alert Tool Fits IBM/System 34

OAKLANDON, Ind. — Business Application Systems, Inc. has announced a project alert system for users of IBM's System/34.

Called PAS/34, the project alert package features capabilities for identifying, tracking and capitalizing on major projects. The project alert package is terminal based and menu driven, a company spokesman said.

PAS/34 costs $1,500. The vendor is located at P.O. Box 36008, Oaklandon, Ind. 46236.

Identical to Quel

Ingres Gets High-Level Cobol Interface

BERKELEY, Calif. — Relational Technology, Inc. here announced a high-level Cobol interface for its Ingres relational data base system for Digital Equipment Corp. VAX-11 computers.

Embedded Query Language (Equel) reportedly allows an Ingres user to embed Ingres queries directly into programs written in C, Fortran, Pascal, Basic and now Cobol.

Because Equel is reportedly identical to the Ingres Query Language (Quel), a Quel user does not need to learn any new concepts to access an Ingres data base from a procedural language, a spokesman claimed. Equel also handles all low-level processing associated with query statements, according to the firm.

The new version of Equel is part of the standard Ingres license, which costs $30,000 from the firm at Suite 515, 2855 Telegraph Ave., Berkeley, Calif. 94705.

Finance Package Targets Small Firms

KIRKLAND, Wash. — Nyplan, Inc. has introduced a financial modeling software package that reportedly runs on two Digital Equipment Corp. systems — the PDP-11 under RT-11 and the VAX system running under VMS.

Nyplan is said to allow small businesses to obtain the benefits of sophisticated modeling and to add features as they become necessary.

The package features a model building format, large matrix size, graphics capabilities, risk and regression analysis and built-in financial routines, the vendor said.

Prices start at $3,500 and increase to $5,000 for a full-capability system.

Nyplan is based at 135 Lake St. S., Kirkland, Wash. 98033.

MCAUTO ENTRY

COMPUTER SERVICES NEWS

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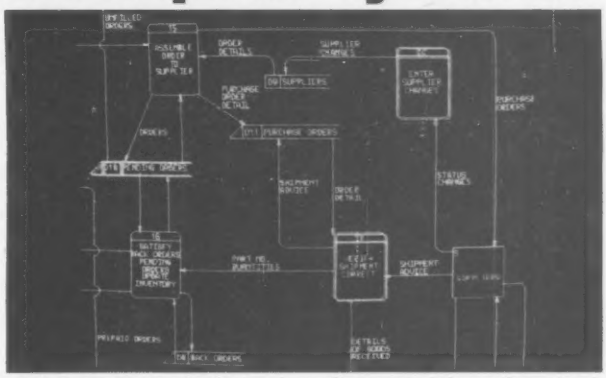

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STRADIS/DRAW is an automated graphic system with which you interactively create and update two-dimensional structured diagrams. It does away with the need for manually drafting and re-drafting graphics and up-dating documentation. It eliminates the need to proofread diagrams, and avoids the potential for error in going from one diagram to the next. You get total capability to produce even the very largest data flow diagrams found in system planning.

All the graphic symbols you need to construct data flow diagrams are within the STRADIS/DRAW system. Just call up the symbol with the touch of a terminal button and move it to the desired spot on the display screen. Create your system structure chart the same way. All the symbols you need to set up and describe modules, interfaces and control hierarchy are at your fingertips.

The system's free-form diagram function gives you an easy way to draw any charts or diagrams you need for data processing documentation. Or use it to draw flowcharts, screen layouts, report layouts, graphs—all of which can be maintained in the system for quick reference and easy updating.

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For more information about STRADIS/DRAW and how it can give you better designs, faster, and at a lower cost, call MCAUTO at (314) 232-5715. Or mail the coupon.

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Harris Vulcan, VOS Users Offered Tape Storage, File Management System

MADISON, Wis. — Two software products for users of Harris Corp. Vulcan and VOS operating systems are available from McHugh, Freeman and Associates, Inc.

• Superkeep (Skeep), a standalone package for tape archival storage of files, provides a tape format similar to the standard Harris Keep/Fetch format, but at a higher tape density and speed, according to a spokesman for McHugh, Freeman and Associates.

Skeep provides its own data base for tape library management with facilities for updating purging and querying locations of files included, he added.

• Vispmanager (VMGR), an indexed sequential-access method file management system, replaces Harris' Vulcan Indexed Sequential Package (Visp), the spokesman said.

VMGR reportedly is compatible with all Visp files, routines and utilities and extends the capabilities of Visp by providing concurrent writing by multiple users.

Single-CPU licenses are available at $500 for Skeep and at $950 for VMGR from McHugh, Freeman and Associates at Olde Towne Office Park, 6333 Odna Road, Madison, Wis. 53719.

Interpretive Language Cuts Costs for NCR On-Line Users

PACHECO, Calif. — Century Analysis, Inc. has introduced an interpretive language said to cut applications development costs for NCR Corp. on-line users.

INTL/6, a real-time development language, reportedly saves time by fully formatting input during coding and effecting compilation on a real-time basis. Link edits are said to be unnecessary because coding becomes available as soon as the compilation is complete, according to the vendor.

INTL/6 can be implemented on all NCR computers operating under the B3, B4 or VRX operating systems. It reportedly supports all telecommunications capabilities of the firm's teleprocessing monitor and all data base capabilities of the firm's business relational data base management system, Plus/4.

Introductory price for the software is $10,000 from Century Analysis, 114 Center Ave., Pacheco, Calif. 94553.

NCR I-Series Get 'Spreadsheet'

WICHITA, Kan. — Software Products Co. has announced Spreadsheet, an electronic spreadsheet package for NCR Corp. I-Series processors.

Designed for use by managers, accountants and financial analysts, the package can be used for forecasting, business modeling, pro form profit and loss statements, cash-flow projections, what-if analysis and job costing, the vendor said.

The package runs on NCR's I-8100, I-8200, I-8400 and I-9000 processors. It costs $327 for users of NCR's IDPS and Imos operating systems and $427 for users of the IRX operating system. A 30-day trial package costs $37, the vendor said.

Software Products can be reached through P.O. Box 18814, Wichita, Kan. 67218.

'Twosix' Aids HP 3000 Users

FOREST HILL, Md. — A software utility package called Terminal Workspace System Intrinsix (Twosix), said to provide full use of Hewlett-Packard Co.'s Series 26 terminal features under the HP 3000 system, is available from Maryland Computer Services, Inc.

Twosix eliminates the need for extensive control and escape sequences, according to the vendor. The package allows for window/workspace configurations to be designed and stored for instant recall as well as full capability for creating and maintaining screen formats, report headings and key definitions in the Twosix library.

Twosix, priced at $2,500/copy with user's manual included, is available from Maryland Computer Services, 2010 Rock Spring Road, Forest Hill, Md. 21050.

National CSS Net Gains Data Base

WILTON, Conn. — National CSS, Inc. announced a securities data base has been added to its CSS/Final integrated financial management system for users of its time-sharing network.

Called CSS/Quotes+, the data base provides information on more than 42,000 securities. These include common and preferred stocks, corporate and government debt instruments and mutual funds, according to the vendor.

CSS/Quotes+ is available through National CSS' dial-up network. It is billed on an as-used basis, the vendor said from 187 Danbury Road, Wilton, Conn. 06897.

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Data Briefs

Rixon Unit Accesses Packet-Switched Networks

SILVER SPRING, Md. — Rixon, Inc. has announced an X.25 packet assembler/disassembler designed for direct access to packet-switched networks.

Called the X.25 Pad, the unit provides an interface between asynchronous terminals and packet-switched networks or equipment that supports the X.25 synchronous interface, the vendor said.

The unit provides complete X.25 compatibility, including Levels 1, 2 and 3, and conforms to internationally accepted standards, including X.3, X.28 and X.29 protocols.

A four-port version of the X. 25 Pad costs $1,700; an eight-port version costs $2,500. Rixon is at 2120 Industrial Pkwy., Silver Spring, Md. 20904.

CRT Unit Targets Portable, Remote Environments

GRANDVIEW, Mo. — Computerwise, Inc. has announced the Transterm 2, a 24-line buffered CRT terminal designed for portable or remote communications environments.

The unit consists of a single-line, 80-char. liquid-crystal display and a 58-key teletypwriter-style membrane keyboard. The terminal communicates in full-duplex RS-232 serial asynchronous Ascii mode.

An RS-422 interface or a 20 mA current loop are available as options, the vendor said.

The Transterm 2 costs $549. Computerwise is at 4006 E. 137th Terrace, Grandview, Mo. 64030.

Interface Capability Out for 300 Line/Min Printers

MIAMI — Innovative Electronics, Inc. has announced an extended communications interface capability for 300 line/min printer systems based on the Teletype Corp. Model 40 printer mechanism.

Called the Innovator 202 FC, the unit provides emulation for IBM 2780 and 3780 terminals, according to Innovative Electronics.

The 202-FC costs $5,495, according to Innovative Electronics, which is located at 4714 N.W. 165 St., Miami, Fla. 33014.

MC-80 Product Line Gets Interface Capability

MIAMI — Innovative Electronics, Inc. has announced an extended communications interface capability for its MC-80 product line to communicate with Radio Shack, Apple Computer, Inc. and IBM Personal Computer systems.

The MC-80 communications processor supports numerous protocols, according to the vendor, and provides on-line and off-line diagnostics, which significantly reduce the cost of ownership.

The stand-alone, self-powered communications processor costs $1,595, a spokesman for Innovative Electronics explained from 4714 N.W. 165 St., Miami, Fla. 33014.

Digilog Offers Bert 511 With DLM III Monitor

MONTGOMERYVILLE, Pa. — Digilog, Inc.'s Network Control Division is offering a built-in 511-pattern Bit Error Rate Tester (Bert) free with its DLM III Interactive Line Monitor.

The Bert 511 reportedly can be transmitted synchronously or asynchronously, features a bit and block error count and displays running time in minutes and seconds. Errors can be injected into the 511 block to self-test the Bert feature.

The DLM III Interactive Line Monitor costs $3,775 from Digilog, 1370 Welsh Road, Montgomeryville, Pa. 18936.

Bell Labs VP Addresses Chip Technology Issues, Future of Circuitry

By Phil Hirsch
CW Washington Bureau

SAN FRANCISCO — Integrated circuits containing one million components per chip will be available "in just a few years," Bell Laboratories, Inc.'s Executive Vice-President John S. Mayo said here recently. In an address to a conference on solid-state technology, Mayo made it clear that the existing telephone network will play a key role in exploiting very large-scale integration (VLSI) technology.

Although the new circuitry is being used primarily in business applications, the home will "set the ultimate requirements" of what Mayo called "information-age technology." All of the related systems, he added, will need access to all other systems and to their associated data bases; thus, there will have to be a high degree of interconnection. Furthermore, since the "signals of the information age range from one to almost 100 million bit/sec," the connections will have to be wideband, digital facilities, Mayo pointed out.

Meeting Requirements

There are a number of ways the existing telephone network can meet this requirement, he said. Specifically:

• "Bit rates in the range of several thousand bit/sec can be transmitted in both directions on one telephone cable pair by using standard carrier modulation techniques above the voice band."

• "Two-way, high-speed digital transmission can also be placed on a single cable pair by sending shuttle bursts of data back and forth in both directions, arranged so that neither end is transmitting at the times it must be receiving."

• "Several million bit/sec can be transmitted in two directions over two telephone cable pairs by using regenerative digital transmission — a technique that has been widely employed in telephone interoffice communications since 1962 and has recently been growing rapidly in the telephone subscriber plant."

Mayo added that optical-fiber cable is another option. AT&T is now building an optical-fiber trunk down the East Coast — between Boston and Washington, D.C. — and has used similar links to interconnect many of its urban telephone switching centers.

Mayo also pointed out that:

• "The ability . . . to deal with data is well advanced in the telephone network and much less well developed in other networks."

• "The cost-effectiveness of solid-state electronics will continue to improve through development of finer line lithography techniques. However, design of the more complex devices — which fine-line lithography makes possible — requires continued enhancements in automated design techniques. It also requires close coupling of system and device expertise to define the most profitable chips to design."

• "As the power of VLSI increases, so do the opportunities for hardware solutions to software problems . . . With these added capabilities, the software designer will have to establish more effective methodologies for software development. Badly needed are better software development tools and automation of software maintenance."

(Continued on Page 43)

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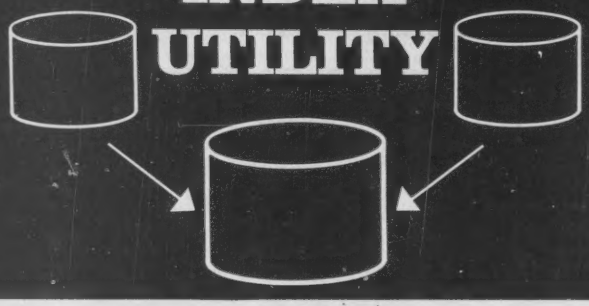

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Two Controllers Out For Ascii Terminals

SPRINGFIELD, Va. — Two protocol-converting controllers for Ascii terminals and printers have been announced here.

The RT9S and RT13S Translators were designed by Renex Corp. to allow Ascii terminals and printers to interface to a Systems Network Architecture network, the vendor said.

The RT9S allows attachment to eight Ascii ports while the RT13S hooks up to 12 ports. The converters cost $9,900 and $10,900, respectively.

Compatible Terminal

Also announced by the vendor was a compatible terminal, the Model R378.

This product is an Ascii terminal that reportedly emulates the IBM 3278 display station when attached either directly or via dial-up to the Translator.

According to the vendor, remote dial-up is simplified with automatic transmission rate detect at speeds of up to 19.2K bit/sec.

The R378 terminal is priced at $1,790, the vendor said from Suite 210, 6641 Backlick Road, Springfield, Va. 22150.

Bell Labs VP Addresses Chip Issue

(Continued from Page 41)

• "The full benefits of automation and a host of information services demand low-cost, error-free data bases with support systems that keep them up to date and . . . synchronized. For these data bases we have a number of memory technologies.

"The latest entry is the optical disk, which, by 1986, should be available at a cost approaching 10 microcent/bit, and that's cheap. Semiconductor memory will continue to fall in cost, as will the moving-head disk file.

"Magnetic bubbles will also continue to fall in cost, but they are not expected to cost less than disk files for some time."

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Multipage CRT Terminal Available

MINNEAPOLIS — The Teleray Division of Research, Inc. has announced the availability of a multipage CRT terminal said to give users application flexibility and authority over terminals.

The Model 16 is compatible with Ansi X3.64 protocol, the vendor said. Major features include redefinable logical line and page lengths, 32 redefinable keys, four pages of display memory that are expandable to eight pages, a choice of either volatile or nonvolatile storage and the ability to use extra display memory as programmable function memory, according to the vendor.

The nonvolatile memory may be allocated to function memory as an addition to the unit's standard 512-bytes of nonvolatile function memory. If only two 24 by 80 display pages are needed in the nonvolatile version, the remaining 24K or more bytes may be assigned to function memory.

The Model 16 is priced at $1,545, with multiple-purchase discounts available, the vendor said.

Research, Inc. can be reached at Box 24064, Minneapolis, Minn. 55424.

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ipl SYSTEMS INC.

Teltone's M-870 Converts IBM 3270 to Ascii Terminals

KIRKLAND, Wash. — Teltone Corp. has released the M-870 Access Controller, an enhanced version of its Data Carrier System (DCS-2) for conversion from IBM 3270 terminals to asynchronous Ascii terminals.

The Access Controller reportedly allows for conversion from the 3270 terminals to Ascii terminals, including IBM's 3101, running on IBM's 370 or compatible host computers.

The Ascii CRT terminals appear to the 370 and the user as 3271-attached 3277 display stations, the vendor said.

The Ascii CRT terminals will connect to the M-870 through other DCS-2 components, eliminating the need for cable by piggybacking full-duplex dedicated 9,600 bit/sec data over voice on existing private branch exchange telephone pairs, the vendor said.

Base price for the M-870 is $15,950, the firm said from 10801 120th Ave. N.E., Kirkland, Wash. 98033.

Sytek Localnet Gains BSC

SUNNYVALE, Calif. — Sytek, Inc. has announced support for Binary Synchronous Communications (BSC) devices on Localnet, its broadband-area network.

The BSC support option is available on Sytek's Model 20/100 packet communications unit (PCU). Localnet 20/100 uses standard, CATV broadband coaxial cable as a communications medium. Each device can support two units utilizing industry-standard RS-232C user interfaces within a network of more than 20,000 concurrent users, the vendor said.

The BSC PCU is said to support a number of BSC-compatible devices, including IBM 2770, 2780 and 3780 workstations as well as IBM 3270 terminals and controllers.

It supports both Ascii and Ebcdic character sets and each PCU can support up to eight permanent virtual circuits, a spokesman said.

The device is available for $1,400 from Sytek, 1153 Bordeaux Drive, Sunnyvale, Calif. 94086.

Adds Unveils Viewpoint/60

HAUPPAUGE, N.Y. — A smart editing CRT terminal said to feature a detachable keyboard with tactile touch keys and selectable audible click has been unveiled here by Applied Digital Data Systems, Inc. (Adds).

The Viewpoint/60 is Ascii compatible and offers extensive screen editing capabilities, according to Adds. It also features fine-line business graphics and five operating modes. It has 25 display lines, with 80 char./line.

With a variety of transmission rates ranging from 110 to 19.2K bit/sec the Viewpoint/60 has three interfaces available — RS-232C, RS-422 or current loop, the vendor said.

This terminal is priced at $895 in single quantities from Adds, 100 Marcus Blvd., Hauppage, N.Y. 11878.

Two Monitors Out

BRISBANE, Calif. — USI International Corp. has announced a high-resolution green phosphor display monitor for personal computers.

The firm is offering 9-in. and 12-in. models that reportedly feature resolution of 1,000 lines at center.

The 9-in. Pi-1 costs $249 and the 12-in. Pi-2 costs $275 from the vendor, 71 Park Lane, Brisbane, Calif. 94005.

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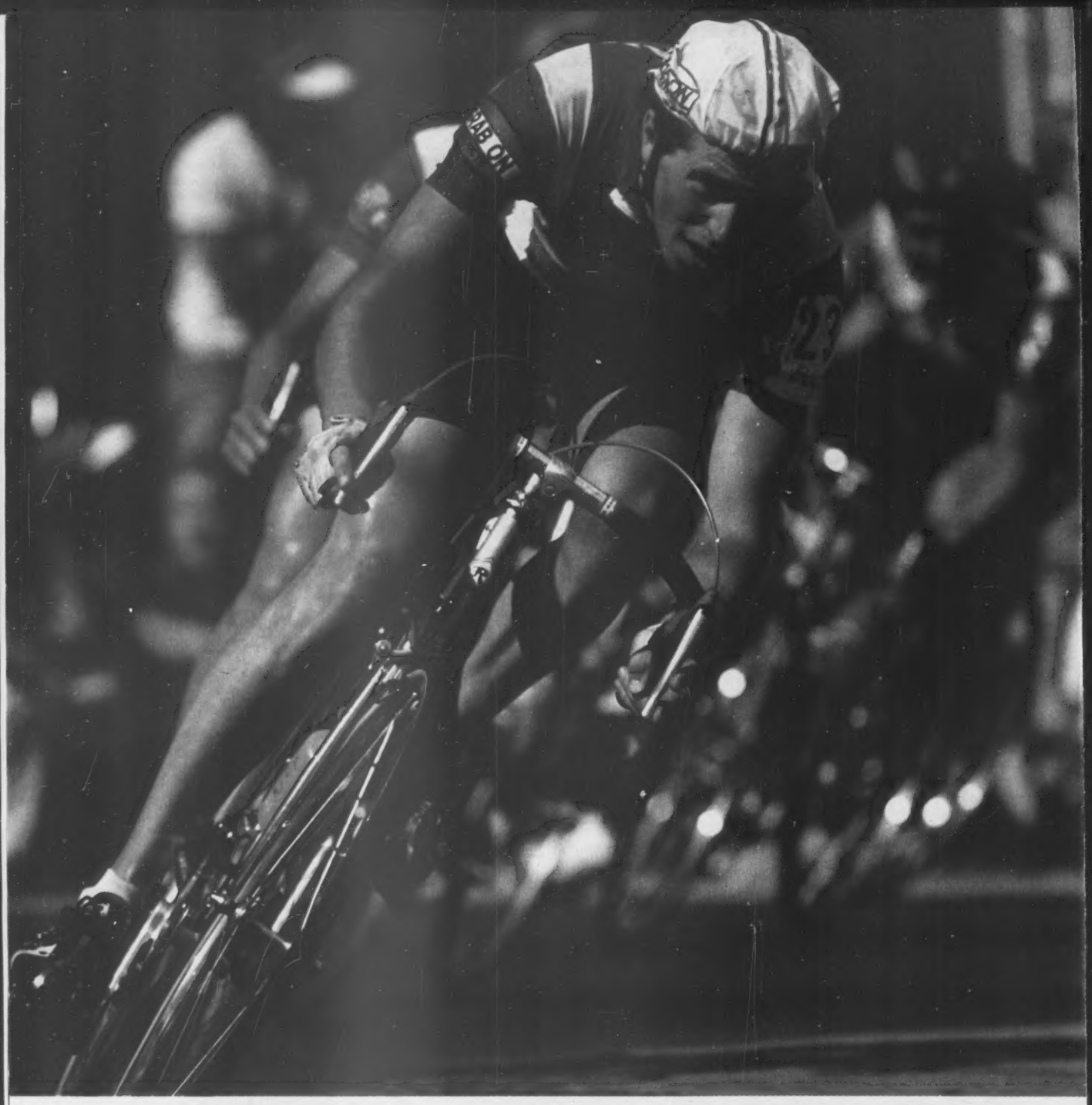

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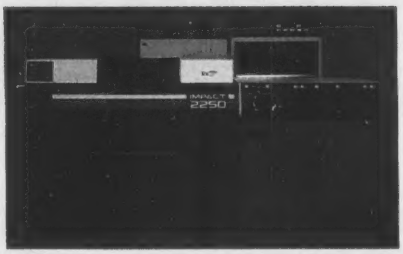

Storage Technology Corporation

Design, Production Tied to One System

Univac Unveils Integrated CAD/CAM

BLUE BELL, Pa. — Sperry Univac has introduced a fully integrated computer-aided design and manufacturing (CAD/CAM) system that reportedly allows users to control the design, engineering and manufacture of products all through the same data base and the same computer system. It is said to be the first system of its kind, according to a Univac spokesman.

Unis-CAD is based on Univac's large-scale 1100 series mainframe and relys on the firm's V77 minicomputer and Megatek Corp. and Adage, Inc. graphics terminals to off-load functions from the main processor and tie together the product design and production stages into a single system.

Univac applications analyst Barbara Pellegrino compares a computer-generated drawing with a finished aluminum bracket produced by Unis-CAD.

System Features

In operation, the 1100 series mainframe — serving as a data base manager — runs the user's analysis programs, performs detailed calculations for solids modeling and maintains a central data base, the vendor said. The V77 minicomputer handles the design drafting and numerical control, while distributed intelligent graphics workstations store display lists, manipulate the graphics and support data tablet interaction.

The benefit of the system is that users reportedly do not have to reinterpret product drawings or designs at each step in the manufacturing process, as is reportedly done with other CAD/CAM systems. Rather, the Unis-CAD system redefines the product's design for each user, while maintaining its integrity through each step of the process, the spokesman noted.

The system is composed of four primary modules: Design, Engineering Analysis, Drafting and Numerical Control. There is also an optional Solids Modeling module.

The Design module, which is the key to the whole system, defines the user's parts and combines them to form assemblies and products. The Solids Modeling module is structured to complement the Design module and lets the user build complex design forms from primitive solids such as blocks, cylinders and spheres, the spokesman noted. The remaining three modules are designed to mathematically test the user's product, prepare an engineering drawing to document the design and instruct machine tools to produce the final product.

The chief benefit of integrating all facets of the manufacturing process within the same computer system is that it shortens the lead time between product conception and production, resulting in a lower production cost, the spokesman claimed.

The Unis-CAD system has a three-dimensional modeling capability, is compatible with 1100 series software and utilizes Baustein Geometry — a software technology that is said to allow users to more rapidly define mechanical parts and to keep track of those parts throughout the design and production processes.

The system was demonstrated recently at Hannover Faire in West Germany and will first be installed at International Packings, a manufacturer based in Bristol, N.H.

(Continued on Page 48)

Burroughs S600 Encoding System Out

DETROIT, Mich. — Burroughs Corp. has unveiled a stand-alone document encoding system that is said to incorporate a number of user-friendly features to help diminish operator fatigue.

The S600 was designed for businesses, such as banks, that encode documents for high-speed processing, according to the vendor.

The S600 programmable read-only memory (Prom) reportedly provides the system with fully programmed magnetic ink character recognition and optical character recognition code lines with one to eight fields each. The Prom program sequences the encoding operation automatically, the vendor said.

An integrated control center on the unit is said to group document handling and viewing activities into a compact area directly in front of the operator to minimize hand, head and eye movements.

Other features include document overlap, which allows insertion of a second document before completion of the preceding encoding cycle; an encoding and audit trail that allows printing to occur in parallel; and a matrix printer.

The purchase price for the S600 is $8,360; the monthly lease price is $283 on a three-year contract.

Burroughs is located at 1 Burroughs Place, Detroit, Mich. 48232.

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Bits & Pieces

Eight-Pen Plotter Offered

CONCORD, Calif. — Nicolet Zeta Corp. has introduced a graphics-quality eight-pen plotter. The Zeta 8 plots at a speed of 20 in./sec and offers .025mm resolution.

It supports English or metric continuous-feed media and can plot on translucent paper, vellum, glossy bond and clear acetate. Pens can be nylon tip or liquid roller and are capped when not in use, the vendor reported.

Both local and remote interface can be selected by the user via RS-232 and IEEE-488, at eight data rates from 110- to 9,600 bit/sec asynchronous, according to the vendor.

The plotter will be available in July for $5,950 from Nicolet Zeta Corp., 2300 Stanwell Drive, P.O. Box 4003, Concord, Calif. 94524.

Micro Label Printer Bows

BRONX, N.Y. — Thermopatch Division has introduced a self-contained, microprocessor-based label printer said to print any length of label in any combination of type sizes and bar code.

Figures are keyboard-selected for imprinting on any flexible substrate from pressure-sensitive label stock to heat-sealable cloth, a spokesman said. The machine will also receive instructions from outside data sources through a built-in RS-232 interface.

Typical price of the unit is $6,995 from the firm at 3505 Pinkney Ave., Bronx, N.Y. 10475.

Paper-Tape Reader Stops Rot

WALTHAM, Mass. — GNT Automatic, Inc. has announced the Model 27 paper-tape reader.

Designed to prevent tape deterioration, the Model 27 employs a buffer memory and is able to read tapes with up to 80% transmissivity. Features include a reel-to-reel design, over-sprocket feed and ½-in. hubs. The tape reader can read up to 1,500 char./sec and permits full reel-to-reel bidirectional reading.

The unit costs $1,595, the vendor said from 1560 Trapelo Road, Waltham, Mass. 02154.

Low-Noise Power Unit Out

LOS ANGELES — Computer Power Products, Inc. has announced a low-noise version of its Whisperpac power conditioner.

The new version is said to provide 100% load isolation from the utility power line, precise 1% voltage regulation supplied to the load and ride-through capability to bridge momentary power outages. The unit has been designed as a synchronous electric motor generator.

Prices start at $17,000 from Computer Power Products, 2900 E. Olympic Blvd., Los Angeles, Calif. 90023.

Univac Unveils CAD/CAM

(Continued from Page 47)

The cost of a typical system is approximately $105,000/terminal, not including the cost of the 1100 series mainframe, according to the Univac spokesman.

The Unis-CAD software can be purchased separately at monthly lease rates of $2,000 for the Design module, $1,500 for the Solids Modeling module, $750 for the Engineering Analysis module, $1,000 for the Drafting module and $750 for the Numerical Control module. All prices include maintenance, the spokesman noted.

Univac can be reached through P.O. Box 500, Blue Bell, Pa. 19424.

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Personal Computers Leave the Nest

By Terry Cox

No longer viewed as 'toys,' personal computers have made their fledgling appearances in businesses everywhere. And MIS managers can't ignore them any more.

CHANGE IN DATA PROcessing often occurs with the speed of a brush fire. The entry of several large system manufacturers into the personal computer arena has fanned such a blaze. But the match was struck back in the mid-1970s, when these small, self-contained desktop computers, costing less than $5,000, were introduced by Apple Computer, Inc., Tandy Corp., Commodore Business Machines, Inc. and other small firms.

These "one-user, one-computer" systems were initially regarded as toys, suitable for playing games but having little or no place in the office. Yet the number of such systems has made it a high-stakes game. In 1981, for instance, Apple Computer's income was up by 237%, based on sales of $334.8 million (up 186%). The 1982 personal computer market is estimated at 300,000 units, excluding sales to home users, and should exceed $1 billion.

The growing demand for these systems, and the accessory and software markets they have created, can no longer be safely ignored by the mainframe manufacturers — a fact they have acknowledged by their entry into the personal computer market. Among the large system manufacturers now involved are Hewlett-Packard Co., Digital Equipment Corp., Xerox Corp. and IBM.

Like his mainframe vendor, the MIS manager is being pushed by the marketplace into taking a stand regarding desktop systems and where they belong in his business. The new products from IBM and Xerox have further complicated an already complex issue by "legitimizing" personal computers. The user, or DP manager, knows that the same company that makes his IBM Personal Computer made its "Big Blue" brother down in the basement. Some MIS professionals, however, view the introduction of personal computers with alarm.

The personal computer environment is in some ways the exact opposite of the environment many people have worked to create. Modern DP systems typically depend on data that is shared by many other programs, creating highly interdependent applications. The growing use of data base management systems is, in a sense, a recognition of this trend. It is easy to imagine the fragmentation that can occur if large numbers of users go their own way, with their own collections of files.

Personal computers frequently seem unsuited to the scale of computation a large company needs. A floppy disk for the IBM Personal Computer will hold 160K bytes; a single 3350, with a capacity of more than 317M bytes, could hold the equivalent of 1,900 floppy disks. Just as the storage capacity seems woefully inadequate, so does computing power. A manager plagued with performance problems on a 3033 may well wonder how an 8-bit microprocessor can compete.

There is also a concern that amateurs might not do a good job of designing, coding, debugging or documenting their systems. Even if the users know what they are doing, without central controls every department will program differently, with resulting waste, duplication of effort and lack of portability.

Standardization among personal computers is nonexistent. Programs written for an Apple II will not run, without modification, on a TRS-80, and assembly language programs for the two are as different as those written for Control Data Corp. and IBM mainframes. Many shops will also find the predominant languages on personal computers, Basic and Pascal, unfamiliar.

The unspoken concern is that MIS personnel will be asked to help salvage a user's project when he gets into trouble, thus playing havoc with the normal DP maintenance and development work load.

Despite these objections, personal computers are, and will continue to be, introduced in most organizations. The impetus is often in the form of people — engineers, salesmen, managers or even programmers — who have acquired access to a personal computer and who like what they see. They spread the word to others, with the zeal of converts. The DP manager finds himself arguing against these small machines to a department head who just bought one to use at home.

The personal computer user looks to his machine as a means of solving an immediate problem and feels that the MIS department cannot solve his problem as rapidly, or as well, as he can himself. Frequently he has a specific application, such as spreadsheet calculations or some specialized analysis, that can, as he sees it, justify the cost of a small system all by itself.

Personal computers can be thought of as "fulfilled" distributed processing. Many of the advantages mentioned in discussions of distributed systems, such as improved reliability and responsiveness, belong to personal computers.

Response time for personal computer applications is predictable, because the stand-alone system is not affected by resource contention. The

IN DEPTH

probability of a system working successfully is the product of the probabilities of each component running correctly and diminishes with each added component. A personal computer, with fewer components, will have a generally better mean time to failure than a large mainframe. If a personal computer does break down, only its users are affected; other personal computers will continue to function.

A personal computer application will not add to the mainframe's CPU load. While an Apple II user's requirements are scarcely a threat to an IBM 370/158, 50 personal computer users could very well consume one — if, instead of using personal computers, they ran their applications under IBM's TSO or CMS. Moreover, the overhead associated with big-system time-sharing drives up the cost of even trivial applications.

The personal computer presents a single environment to both the programmer and the user. The programmer codes and tests his application exactly as it will run when it is in production. The TSO or CMS programmer typically designs his application for batch, or for a transaction driver such as CICS. The system development tools he uses are incompatible with the application he is working on; out of necessity, he finds himself working with core dumps or bringing up a CICS "test system" to debug a program. Consequently, his programming productivity is lowered. This difference can allow programmers to produce programs much more quickly on personal computers.

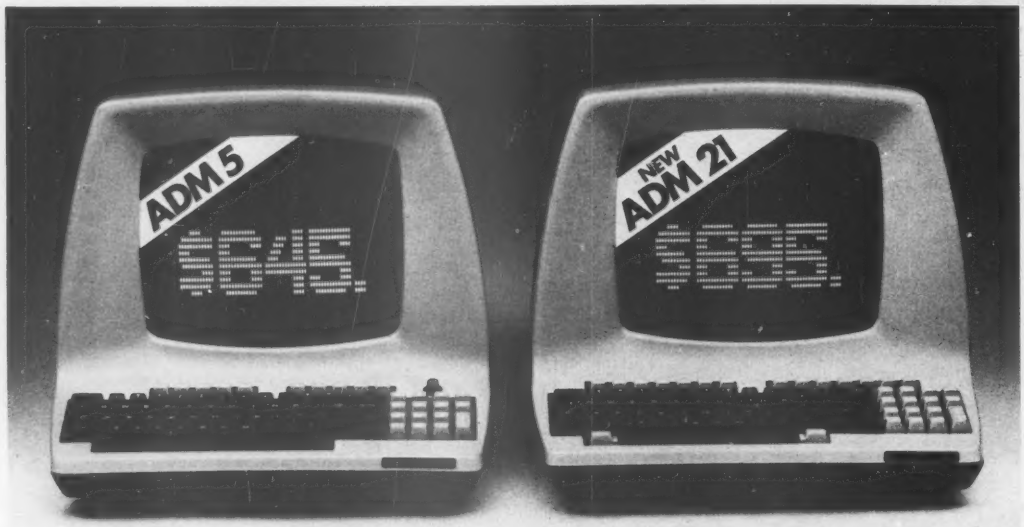
Affordable Software

An astonishing amount of affordable packaged software is available for personal computers; many of the packages that run on small machines can be bought out of petty cash. One such package, Visicorp's Visicalc, has been credited with selling more Apple and TRS-80 computers than any other factor.

Because of the enormous number of personal computers and the low costs associated with writing personal computer software (much of it is written by freelancers at home), home computer applications are available for very specialized markets, aimed at small segments of the population. Today packages are available for such diverse groups as farmers and dentists. We can expect future packages for such user groups as forms designers, facilities planners, electricians, computer operations managers and the like. Since any large organization is comprised of collections of specialties, the emerging specialized software will find more potential users within the organization.

In the last two years, a number of dial-up consumer information networks have been established, the largest of which are Compuserve and The Source (from Source Telecomputing Corp.). These networks offer computer services and shared data bases that are as valuable inside the office as they are in the home.

Services offered, for a time-usage fee, include access to



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LEAVING THE NEST

IN DEPTH

the "live" reports of the Associated Press and United Press International, on-line copies of the *New York Times* and dozens of other newspapers, restaurant guides, airline schedules and electronic mail facilities. Compuserve is currently working with *World Book Encyclopedia* to bring the encyclopedia on-line. The Dow Jones Information Service, another utility, allows a personal computer owner to keep track of trading instantly from his office, as if he had a ticker tape at his desk.

Today there are at least 600 accessible on-line data bases within the U.S., and new ones are added all the time. Access to this data gives the using company a competitive advantage. Radio Shack, for example, sells a software package for the TRS-80 that gives a user access to the Westlaw electronic legal research library, which permits legal searches by specifying keywords relevant to a case; it also gives access to federal court decisions, federal tax files and the U.S. code.

New Applications

In addition to an ever-growing amount of specialized software, personal computers will offer new application opportunities.

They can provide extended distributed data entry for an organization. It is ironic that DP managers who oppose users' minicomputer systems have created a burgeoning demand for stand-alone data entry systems. The advent of cheap personal computers, with IBM 3740-compatible floppy disk drives, or with dial-up or network access to mainframes, allows off-line data entry to be easily distributed to user departments.

Other new applications revolve around the portability possible with small computers. Advertisements for the Osborne Computer Corp.'s Osborne 1 personal computer show two salesmen, one carrying a briefcase and the other an Osborne 1 in its carrying case. "The guy on the left doesn't stand a chance," the ad states — which is why systems like the Osborne 1 will rapidly replace briefcases for account representatives, engineers, doctors, managers or anyone who must travel in connection with his job.

The portability and price of personal computers also offer alternatives to telecommunications links for companies that have personnel located in areas with poor telecommunications availability (or high telecommunications charges).

Another area for exploitation is the substitution of personal computers for IBM 3270 and teletypewriter terminals in existing networks. The computer functions exactly like the terminals it replaces, but also provides the extra power of a computer to its users. Such substitutions can be surprisingly inexpensive. A 3275 Model 12 terminal costs $3,835; a TRS-80 Model II with 64K bytes of storage and one disk drive, $3,899; the software to make the TRS-80 emulate a 3270 costs $995.

'It is ironic that DP managers who oppose users' minicomputer systems have created a burgeoning demand for stand-alone data entry systems.'

For Text Editing

The text editors available on personal computers can rival their mainframe cousins in power. Since text editing is one of the primary functions of programmers, personal computers can be used as "programmer workstations." In a mainframe environment, the personal computer provides the programmer with the editing facilities and program storage currently provided by TSO or CMS. Software emulation, which makes his workstation look like a TSO or CMS terminal, gives him a method of submitting jobs and of examining output at his workstation.

Unless the user community is running applications on personal computers, of course, the programmer cannot actually compile and test programs at the workstation. With the

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IN DEPTH

workstations connected to the host system as TSO or CMS terminals, however, the function is not lost where it is needed.

One implication of this is that programmers may use their home systems to develop programs intended to run on the company's machines. Companies are actually loaning programmers and users computers to take home so that they can work on a hot project over the weekend without coming into the office. A by-product of this trend will be an increase in the number of freelance and contract programmers working part-time from their homes.

Word Processing

Word processing is the first application put up on many home computers. There is a wide variety of word processing programs and spelling checkers available, and a personal computer with a letter-quality printer can be acquired for less than $5,000.

Many firms that have installed centralized word processing systems have eliminated secretarial positions in order to cost-justify the systems. The elimination of secretaries, however, has lowered management's productivity. Affordable, dedicated word processing personal computers can offer the advantages of central word processing in a decentralized, low-cost environment.

A secretary can also use the computer for a variety of small applications that are not practical on mainframes, such as appointment calendars, phone lists and data bases replacing small files. These would be difficult to cost-justify on a large system; on a personal computer, the user programs them himself. Calendars and memo files on floppy disks represent the "small change" of personal computer applications.

The benefits of introducing personal computers to the company extend far beyond specific applications. One by-product of their moving into the office or factory is that users become "computer literate." They learn computer jargon and understand the concept of fields, records and files. Through experience, they learn what computers can and cannot do. As a result, the users develop a greater awareness of the tasks facing professional programmers and analysts. The dialogue between users and DP personnel improves.

Computer-literate users can be the driving force toward improved use of computer technology in the business, and effective use of computer technology may be the difference between corporate failure and success.

Laying Out a Strategy

If the decision is made to introduce personal computers into the company, a strategy for doing so should be devised. A haphazard approach will lower the potential of the new machines and delay their acceptance by both users and MIS personnel.

The first step is to decide what sort of systems belong in the company and help users acquire those systems. Many firms simply place a ceiling on expenditures for personal computer systems and allow users to buy systems freely, using normal cost-justification procedures, as long as they are priced below the ceiling. If the proposed application costs more than the ceiling price, it belongs in the MIS department.

Service to prospective users can begin by offering consultation in evaluating and selecting the systems, as long as the actual decision is left in the user's hands. Such services should not be forced on users. The obvious risks of introducing inferior products and of proliferating many different products will largely cure themselves. The user's objective is simply to accomplish some end result; he is not biased for or against any particular product. He will not overlook the advantages of using the same personal computer as others in the company. If additional controls are required, the organization should adopt a standard allowing only certain machines or supporting selected machines only.

The services that personal computer users tend to need are more likely to be consulting and problem assistance than programming manpower. The methods of providing such services are identical, for the most part, to those espoused by IBM in its Infor-

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IN DEPTH

mation Center concept. A group charged with the responsibility of supporting small computer systems is established and staffed. It provides consultation, a "help desk" for problem assistance, training courses and a formal communications path for dealing with the new systems.

The establishment of a users' group, with periodic meetings and a newsletter, is also a good idea. The user is going to get the information he needs somewhere; the goal is to try to be at least one of those sources. Computer users in the firm need adequate supplies. The distribution of computer forms and diskettes through company channels will not only help the users, but it is also a way of keeping tabs on the level of computer use.

If MIS managers are to support personal computers, they must become informed about the subject. The DP department is just as good a candidate for personal computers as any other department.

The old saw that the last place in the company to automate will be the computer room can be partly put to rest with the purchase of a personal computer. There are excellent project management packages available for personal computers; they adapt nicely to the task of controlling programming projects. Spreadsheet calculation packages can help to unsnarl DP budgets. Even such mundane chores as keeping the computer forms inventory, scheduling the computer or maintaining a report distribution file can be placed on the small machines.

Data Sharing

The need for data sharing between personal computer users and mainframe systems is acute, but the marketplace is responding. Local networks — software systems that interconnect minicomputers through twisted-wire pairs, coaxial cable or bus extensions — are emerging rapidly. MIS managers should prepare for this technology and begin planning for its implementation. The selected local-network protocol should allow the interconnection of the existing mainframe's operating system, where the data is, to personal computers, where the users are.

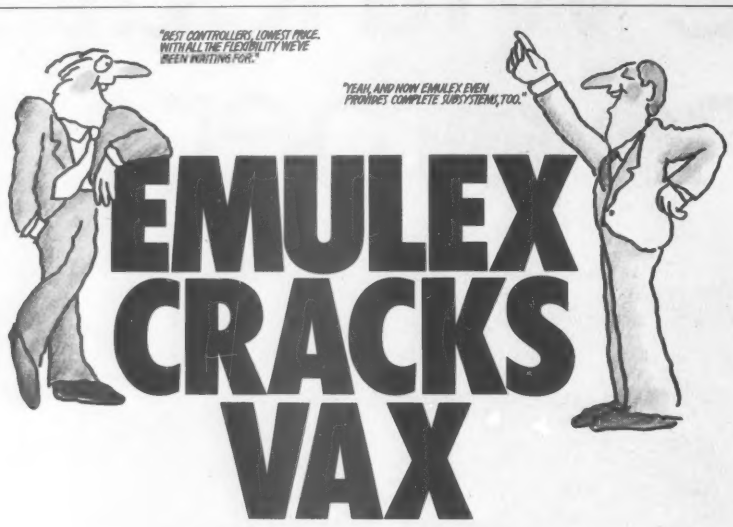
As the 1980s progress, more organizations will use collections of computers of all sizes, from large mainframes, through dedicated "application machines" such as IBM 4321s, right down to personal computers. These machines will be tied in a corporate network, which will also access office automation equipment and, through intelligent private branch exchanges, the company's voice communications. The corporate network will have access to teleprocessing facilities, and this access will extend to numerous public-service networks and even to other organizations' networks.

Local networks, introduced to support personal computers, will advance the introduction of data base management systems by speeding the advent of "data base machines," or back-end processors. These processors will run data base management systems, such as Cullinane Database Systems, Inc.'s IDMS and Cincom Systems, Inc.'s Total, which control both the data bases and the hardware on which they reside. These machines will use the networking facilities to communicate with the current mainframes, as well as with personal computers, giving the requesting machines, whether large or small, the necessary information.

Existing "bread-and-butter" applications will continue to run unchanged on mainframes compatible to today's, but future applications will increasingly be designed to fit the network. While it is certain that the personal computer systems of tomorrow will be much different from those available today, such a statement could also be made with assurance about large mainframes. Just as the company cannot wait for tomorrow's large systems, neither can forward-looking companies ignore the powerful personal computer systems available today.

About the Author

Terry Cox is systems programming supervisor at the York, Pa., division of Borg-Warner Corp. He has been a systems programmer working on IBM systems for 11 years.



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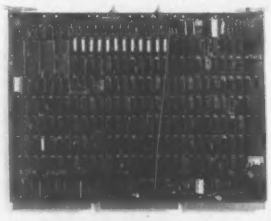

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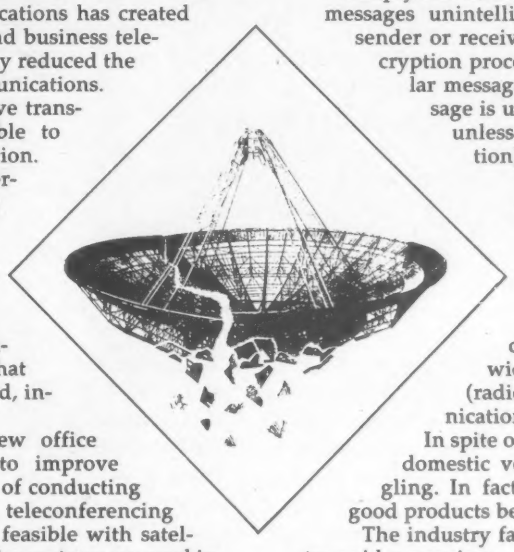
Satellite Communications And Vulnerability

By J. Michael Nye

AT A TIME WHEN THE NEED FOR RETHINKING THE problem of security has never been greater, particularly for satellite systems, far too many users are unaware of the risk of electronic interception.

The use of satellite communications has created new markets in pay television and business teleconferencing and has significantly reduced the costs of routine business communications. Unfortunately, satellite microwave transmissions are uniquely vulnerable to eavesdropping or active interception. It is relatively inexpensive to intercept down-link satellite signals and requires very little technical training.



In addition, satellite signals can cover a large area. A signal beamed by satellite to New York City, for example, could have a "footprint" that covers the entire Eastern seaboard, including the western tip of Cuba.

With the "explosion" of new office automation systems designed to improve productivity and reduce the cost of conducting business, electronic mail and teleconferencing have become widespread, made feasible with satellite technologies. When these office systems are used in communications applications, information can be intercepted, altered and retransmitted without the knowledge of the sender or receiver. The risk of detection to the interceptor is minimal, almost nonexistent. Pay TV programs are easily pirated, with lost revenue to cable companies projected at more than $100 million for 1982.

For a few dollars, an eavesdropper with little technical knowledge can tap a telephone line or data circuit. Because a physical tap is involved, there is some minimal risk of detection and prosecution.

However, microwave communications can also be "tapped" for as little as a few thousand dollars by semi-technical experts. In such cases, it is impossible to detect eavesdroppers, who have much to gain. More than 70% of all toll calls are transmitted by microwave, many of them by satellite. Typical microwave traffic for business includes voice, computer data, facsimile, TWX/telex, teleconferencing and communicating word processors.

In the face of rapidly increasing use of these new communications systems, it might be assumed that security issues have been given due consideration. In reality, however, security has been virtually ignored by both the vendors and users of these new devices.

Encryption is a fairly simple way to protect electronic transmissions. The market for encryption devices should be strong and healthy. Unfortunately, suppliers are struggling to survive, even though the need for these products has never been greater.

Simply stated, encryption is a process that renders messages unintelligible during transmission. The sender or receiver need not be aware of the encryption process, since both see only the regular message. However, an intercepted message is unintelligible to the eavesdropper unless he knows the key (or combination) used to encrypt the message.

We have identified 39 major domestic and foreign vendors that offer 185 different products (see Figure 1 on In Depth/10). The technologies include analog scramblers, narrowband digital voice encryption (normal telephone calls), wideband digital voice encryption (radio communications), data communications security and facsimile security. In spite of such a wide product range, most domestic vendors in this market are struggling. In fact, some have already withdrawn good products because of insufficient sales.

The industry faces several significant roadblocks to rapid expansion:

1. Almost all currently available products are stand-alone, with prices ranging from several thousand dollars per "black box" up to $20,000. Adequate protection for at least one data channel can cost as much as $40,000.

2. Most domestic vendors have a limited product mix, primarily because of the relative immaturity of the domestic marketplace. On the other hand, many foreign vendors offer products in a variety of technological areas from scrambling to digital facsimile protection. Such diverse product mixes assist these vendors in offering interoperability for mixed-application requirements. Unfortunately, most domestic vendors offer only a single product type, whether it be a data encryption device or analog scrambler — not a mix of products across a wide application range.

3. There is a significant lack of user awareness regarding electronic interception and the vulnerabilities of existing communications networks. It is reasonably simple to tap communications lines and intercept radio-frequency communications using readily available, low-cost scanners. In addition, microwave communications can be intercepted for as little as a few thousand dollars.

Indeed, some industry estimates claim a current installation base of more than 28,000 television receive-only earth stations (TVRO), critical components for inter-

DATA SECURITY

The first in a series of messages on advanced technologies from Honeywell Information Systems.

Preventing unauthorized access to data stored in computers is no longer an esoteric, back-room problem. The data is so valuable an asset that to have its integrity destroyed, altered or in some other way violated unintentionally or by artful programming can cause irreparable—even fatal—harm to an organization.

With any large, general-purpose timesharing system, the easy sharing of both programs and data would seem incompatible with security. Yet the three-dimensional data security mechanism in the Honeywell Multics system not only makes controlled sharing possible and convenient, but has earned Multics a reputation as the most secure, general-purpose system on the market.

The Standard Defense

Data security usually is provided by specialized (i.e. incremental to the basic system) operating software that controls the sharing of computer resources, programs and data. To prevent unauthorized access to data or programs, this operating software can use a set of tables listing the authorized users along with their access rights—such as read, write, execute. The operating system scans this table on each reference to a block of data. In theory, it's an unbreachable defense.

In practice, it's vulnerable, largely because operating systems—composed of many complex programs with frequent modifications and patches—contain errors. The more complex the system, the more patches and alterations it has and the more susceptible it is to exploitation.

Honeywell's Approach

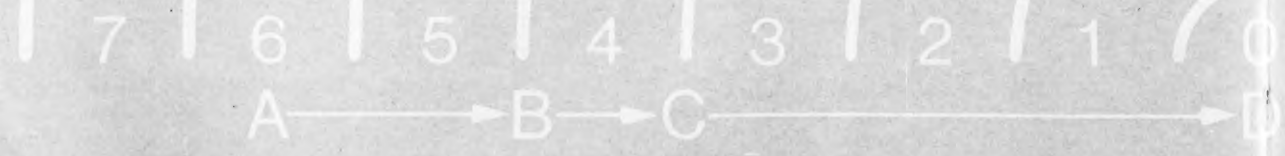
Honeywell has reduced the complexities of the final software system. Multics was designed and developed so that its security mechanisms could grow without reorganization. Assuming at the outset that it was impossible to foresee all problems at the design stage, the Multics software was written to be easily redesigned (rather than patched) should problems crop up upon implementation.

Functions were added as subsystems, rather than modifications. As a result of these and many other design decisions, exploitable design flaws in Multics, for all practical purposes, are nonexistent—even though the current operating system has matured over many iterations.

Discretionary Access

As the first defense, Multics provides a discretionary access control mechanism consisting of a table that lists the names of those authorized (and denied) access to each and every file. This table, called the Access Control List (ACL), also lists the access modes—read, write, execute—allowed each user.

All authorized users also have a unique personal identification (ID) plus a project identification. The personal ID is authenticated by an encrypted password stored in the system. The encryption algorithm, however, is a one-way algorithm so there is no algorithm for recovering the encrypted password in clear form. When at log-in, the system requests the user's password, his terminal print mechanism or screen is automatically turned off

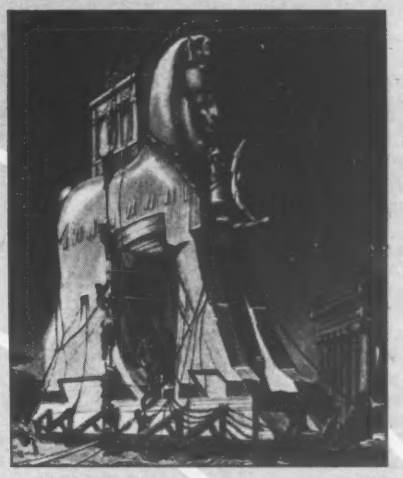


The call bracket defined by the ring numbers associated with each program is used to restrict the sequences in which programs can execute. In this example, the user operating in ring 6, references in turn programs A, B, C, and D, with ring numbers (6,6,6), (4,4,6), (2,5,6), and (0,0,4). When program A calls program B, the user's ring changes to 4, the highest and only ring number in program B's execute bracket. When B calls program C, the user's ring number remains the same. When B calls C and C calls D, the ring number changes temporarily to 0. The ring numbers of these programs prevent program A from calling directly to program D. The user must pass through program B, called a gate, to reach program D. The ACL and AIM settings on gates can be used to control access to inner ring programs and data, making it much easier to protect them from misuse. The bottom line is that the user is secure in the knowledge that the hardware and software mechanisms of Multics protect his programs and data from unauthorized access.

or masked, so that the password is never displayed. Passwords are controlled and can be changed by each user. Software tools can force users to change their personal passwords within a given time.

Non-discretionary Access
To prevent inadvertent (or intentional) release of data, the system also provides an extended access control system called Access Isolation Mechanism (AIM).

AIM protects against unauthorized release of data by assigning levels of classification to data files and levels of clearance to the user. It then matches clearances and classifications. For "read" and "execute" access modes, the user's clearance must be higher or equal to the classification of the data block. For "write" access, the clearance must match the classification.



AIM defeats the "Trojan Horse" ploy whereby a programmer hides within a legitimate, often-used program some additional code completely unrelated to the documented function of that program. That code, for instance, might search the storage system for data to which the programmer has no access.

Hardware Rings
The two security mechanisms are protected and further enforced by specialized hardware, called the Ring Mechanism, which makes Multics a uniquely secure repository.

Files dwell within rings, numbered from 0 to 7. The lower the number, the more privilege is conferred on the executing program and its associated files. A special hardware register keeps track of the ring number in which each user's application is executing. The ring number increases or decreases within the access mode limits set for each user as the application references different files. The limits set for each user are implemented in ring brackets: the read, write, and execute/call brackets.

User access to files is determined by all three mechanisms: ACL, AIM, and the ring brackets. The user can process a file only if he is permitted the kind of access authorized by the security mechanisms.

The ring mechanism also protects itself from attack. Ring numbers of files can be changed only by authorized users. The operating system checks every attempt to modify ring numbers to assure that the attempt is legitimate. The rings also protect the users' subsystems.

User Control
When an authorized user changes the protection modes on a file, these changes are reflected to all users of that file immediately. That is, access permissions and denials are dynamic and are re-calculated by the hardware with no loss in system performance during the execution of every computer instruction.

More on Data Security
For an in-depth paper on Multics Data Security call our toll free number 800-343-6294 (in Massachusetts call 617-552-2264) or write Honeywell, 200 Smith Street (MS 487), Waltham, Massachusetts 02154.

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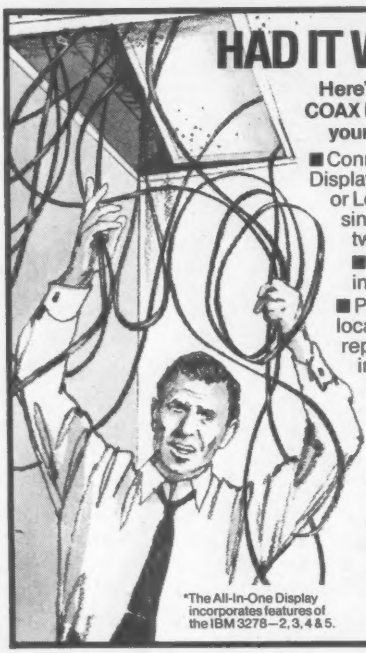

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Domestic Vendors
(February '82)

Vendor	Products	VS-A	VE-N	VE-W	DE
American Satellite Corp.	1				1
Analytics	5				5
Boeing Aerospace Co.	1	1			
Codex Corp.	1				1
Collins Communications	3				3
Collins Telecommunications	7	5	1		1
Com/Tech Systems, Inc.	4				4
Controlonics Corp.	13	13			
Datotek, Inc.	14	6		1	7
Extel	1				1
Fairchild Electronics Co.	1				1
Fargo	2	2			
GTE Sylvania	2		1	1	
Harris Corp. Government Systems Group	1		1		
Harris Corp, RF Communications Division	6			6	
IBM	2				2
Lear Siegler, Inc.	1	1			
Linkabit	1				1
Mieco	12	12			
Motorola, Inc.	7	1		6	
Ocean Technology, Inc.	1			1	
Racal-Milgo Information Systems, Inc.	2				2
Rapicom, Inc.	3				3
Scientific Radio Systems, Inc.	1	1			
Technical Communications Corp.	11	8			3
Transcript International	1	1			
SUMMARY: Products — Vendors — 26	104	51	3	15	35

Nondomestic Vendors

Vendor	Products	VS-A	VE-N	VE-W	DE
AB Transvertex (Sweden)	5		1	1	3
AEG Telefunken (West Germany)	5		1		4
BBC-Brown, Boveri & Co. (Switzerland)	9	6	1		2
Crypto AG (Switzerland)	13	2	1	2	8
Gretag Ltd. (Switzerland)	13	2	2	1	8
Marconi Communications & Broadcast Division (England)	1	1			
Marconi Space & Defense Systems (England)	9	2	2	1	4
Merck & Hollander Ltd. (England)	1				1
Miller Communications Ltd. (Canada)	1	1			
Racal-Datacom Ltd. (England)	12	6		1	5
Tadiran (Israel)	3		1	1	1
Telsy Electronic Telecommunications (Italy)	6	6			
Teltron (West Germany)	3	3			
SUMMARY: Products — Vendors — 13	81	29	9	7	36

NOTES:
VS-A — Voice Scrambler-Analog
VE-N — Voice Encryption-Narrowband
VE-W — Voice Encryption-Wideband
DE — Data Encryption

Figure 1

ception. About 75 vendors offer TVROs at prices as low as $5,000. Projections for 1985 show more than 200,000 installed TVROs with prices as low as $2,000. Earth stations are easily obtainable, economical and simple to use for pirating pay TV or intercepting business communications. Furthermore, the rapid expansion of mini- and microcomputer technology has created an environment for passive or active electronic interception, with dial-up networks being particularly vulnerable.

User Education

There have been some half-hearted attempts to educate user groups through press coverage of major criminal activity and articles in the technical press. However, it is difficult to convince users to acquire cryptographic equipment when it may cost several times more than the equipment it was designed to protect. For example, how do you convince a customer who spends $1,200 for an analog fax machine to add a sophisticated scrambler for $5,000?

In one sense, the scientific community's debate on the Data Encryption Standard (DES) has been counterproductive in the user groups. Extensive press coverage of the debate concerning DES' weaknesses to attack has given readers the impression that the DES is of no value. As a result, some users do nothing.

However, industry trends are making it increasingly important that us-

IN DEPTH

ers learn about their systems' vulnerability and the available means of protection. Specifically, in the office, information previously "safely" stored in filing cabinets, binders, note pads and desk drawers is now being organized, recorded on electronic media and processed by word processing systems, text editors, distributed computers and so on.

Other rapidly expanding technologies include information distributors (copy machines that communicate), facsimile (with a network approaching 500,000 units), teleconferencing, electronic mail, voice mail and store-and-forward capability. All of these technologies are vulnerable to interception during transmission over phone lines (see Figure 2). It seems unlikely that many of these new technologies, particularly teleconferencing and electronic mail, will really succeed if the communications security issue is not resolved first.

Growing Threats

About $30 billion is spent annually on voice and data communications services. *Business Week* predicts this figure will reach $150 billion by 1990. It has been estimated that more than one million personal computers are already installed in the domestic market. These devices are great tools for "breaking into" computer data files by simply calling (dialing up) the computer. Some observers estimate that as much as $3 billion is lost annually through electronic thievery. The expanding financial and technical resources of terrorist organizations represent an increasing threat to the economic stability of the financial and business community.

On an international basis, the financial community electronically transfers through the interbank clearinghouse payment system as much as $120 billion each day, yet this network is unprotected. Of the world's eight largest banks, only four do any encryption at strategic locations, while none of them routinely encrypt telecommunications.

It is just a matter of time before a terrorist organization will strike a blow for "freedom fighters" around the world by tampering with important business transactions, destroying computer data files or completely disrupting the orderly financial transactions of the banking community. The threat from organized crime is real.

At a recent security conference sponsored by the International Association of Satellite Users, Lee Paschall, president and chief executive officer of American Satellite Corp., commented that his company has offered encryption services to its customers at an additional cost estimated at about 10% — with few takers. A similar finding was reported by Kenneth Cox, vice-president and general counsel at MCI Communications Corp. He said that few MCI customers have shown any interest in security, even though the company would offer security options if customers required them.

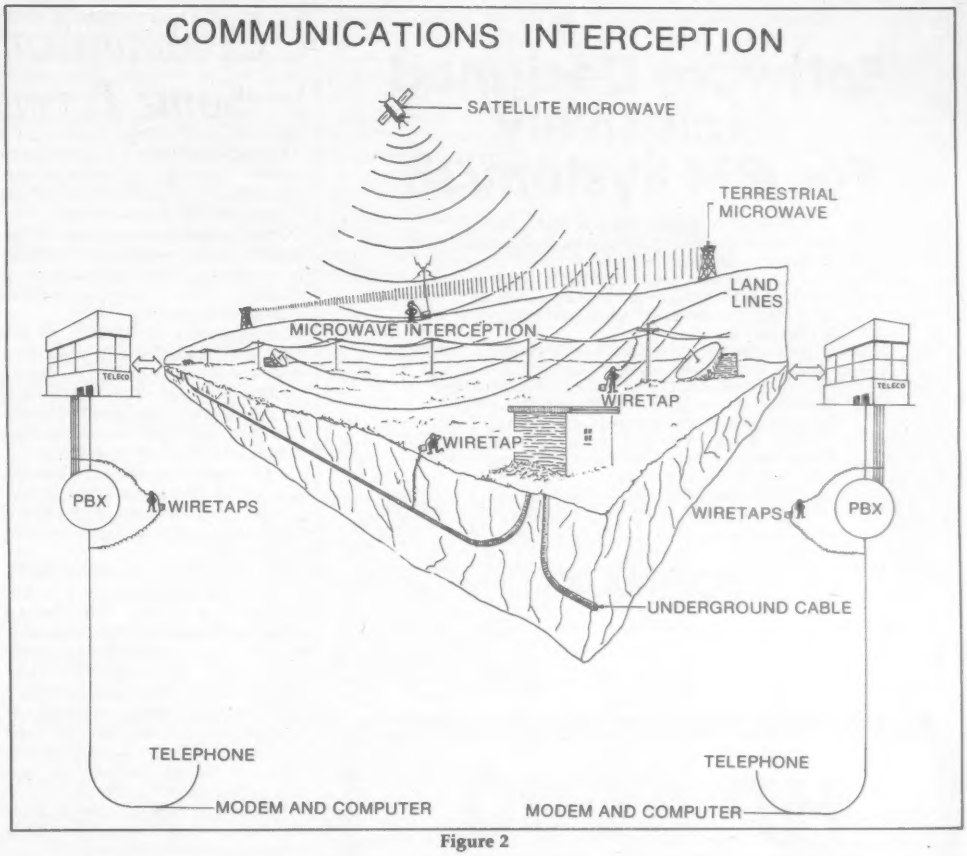

Figure 2

Cox noted, however, that MCI took its lead from AT&T in tariff writing by using similar disclaimer language which says that the vendor is not responsible for any customer losses resulting from electronic interception, since it is almost impossible to protect satellite communications links. Obviously, the common carriers understand the risks, but it is not in their best interest to warn the user, since such warning may impact sales.

Toward a Solution

A number of programs should be instituted immediately as a first step toward solving some of these vulnerability problems. In particular, a comprehensive education program should be set up by the government, academic and private sectors to inform users.

More important, we must encourage communications equipment manufacturers to build cryptographic options into the primary product. The value-added feature of cryptographic options to existing communications equipment can substantially reduce the cost of such options to the user without affecting the cost of manufacturing the original product itself. For example, DES-based chips

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Communications Security: Some Terms of the Trade

Analog scrambler. A device used to encode a voice (or other analog) signal so that it is unintelligible except when decoded or unscrambled.

Communications security. A generic term that describes procedures to be used to protect the information content of messages that are communicated electronically.

Cryptography. (1) The art or science that relates to the principles, means and methods for rendering plain information unintelligible and for reconverting encrypted information into intelligible forms; (2) the design and use of cryptosystems.

Data communications security. The use of cryptography to protect the information content of digital data messages that are communicated electronically.

Data Encryption Standard (DES). Specifies an algorithm to be implemented in electronic hardware devices and used for the cryptographic protection of digital, binary-coded information. The encryption/decryption key is based on 64 binary digits (0 or 1), of which eight bits are used for error detection. Published in January 1977, the standard is described in Federal Information Processing Standard Publication 46.

Dial-up network. A communications circuit that is established by a switched circuit connection.

Distributed data processing system. A system with distributed intelligence differs from a multiprocessing system in the way that tasks are handled. Although both systems use multiple processors, the tasks assigned to a distributed system remain fixed. By contrast, in a multiprocessing environment, a continuous stream of assignments is fed to a single node and allowed to be distributed according to complex resource-allocation algorithms across the entire network.

Electronic interception, active. The interception, modification and retransmission of communications traffic where the original sender and intended receiver are unaware of message modification.

Electronic interception, passive. The interception and monitoring of communications where the unintended receiver gains knowledge of message content.

Facsimile (FAX). A system of telecommunications that transmits images for reproduction on hard copy. The original image is scanned and converted to an electrical signal, and the electrical signal is subsequently converted to a replica of the original image at the receiving terminal.

Interoperability. The capability of various components to work with one another.

Information distributor. A system that provides for the merging of photocopies and communications technologies to allow photocopies to be transmitted electronically (over phone lines) to geographically dispersed devices. Similar to facsimile.

Key. In cryptography, a symbol or sequence of symbols (or electrical or mechanical correlates of symbols) that controls the operations of encryption and decryption.

Key management. Control of key selection and key distribution in a cryptographic system.

Multiencryption. Repeating a plaintext-to-ciphertext operation several times; encryption of an already encrypted message with the same or different key.

Narrowband digital voice encryption. The conversion of voice analog signals to digital signals from 56K bit/sec to 2.4K bit/sec to allow transmission over voice-grade lines. The compressed signal is then encrypted to provide transmission security.

Public key. Separate but related cryptographic keys used for enciphering and deciphering. The sender knows and uses the receiver's public key for enciphering the message, while the receiver can only use his secret key, which is related to his public key as a method for deciphering the public key ciphered message. In this case, the sender and receiver must protect the secret key, while disclosing only the public key to each other.

Rapid key change. The procedure of changing key variables rapidly during the encryption process in a single session. Keys can be changed once for each session or every microsecond during the transmission session, depending on security levels required.

Store-and-forward. The handling of messages or packets in a network by accepting the messages or packets completely into storage, then sending them forward to the next center. Also, the capture of transaction data on magnetic media for subsequent batch input to a computer later on.

Teleconferencing. A method of conducting meetings between geographically dispersed offices where the participants use electronic means (voice and video) to exchange information.

Trap door (cryptosystem). Useful in deciphering ciphertext without knowledge of the key, but with specific information about how the encryption function is designed to reduce the work/break time and cost.

Transborder data flow. The movement of data between borders by electronic means.

Voice mail. A method of storing voice-recorded messages for delivery to an intended receiver.

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are available for about $15 in volume quantities.

Routine and automatic bulk encryption at all satellite communications terminals would significantly reduce the per-message cost and would not affect operation of the common-carrier service. For some reason, the common carriers seem to take the attitude that communications security is the responsibility of the customer and the carrier should be free from any liability or responsibility. Such attitudes would change quickly if the carriers were required to have customers sign release forms absolving the carrier from responsibility or if all communications devices carried warning labels to remind the user of the risks (see Figure 3).

Appropriate Protection

Users need a more clear definition of the type of information that should be protected in relation to the perceived threats. For example, the most common threat to industry and civil government is the casual or inadvertent release of information caused by such phenomena as "cross talk" in voice conversations or by pure transmission mistakes. Other threats include breach of security by students, revengeful employees, security consultants or market researchers (for reasons of industrial espionage), competitors and organized crime.

****WARNING****

Use of this device is at your own risk. Unintended listeners can easily intercept your transmission, so you should not discuss or transmit information you would not want others to know. Use of this device releases the manufacturer of this device and the communications carrier from any liability for losses to you as a result of the interception of your transmission by others.

Figure 3. Suggested Warning Label for Communications Devices

Obviously there are other parties, among them foreign governments, that have sufficient financial and technical resources as well as the motivation for intercepting and counterfeiting traffic. It is reasonable to assume that DES or DES-like cryptographic systems can provide adequate protection from these threats.

It is strongly recommended that the scientific community tone down its debate on how secure is secure, specifically with regard to the DES. The important consideration is from whom the system must be protected. The relative argument against the level of protection offered by DES may be valid only if the perceived threat is a government's intelligence or police agency.

For that matter, any publicly available cryptographic system is probably not strong enough to protect against the sophistication of such organizations if they are determined to intercept traffic. However, a DES system can make it quite expensive for them to intercept, suggesting that they will use other less expensive methods of information gathering, so the risk of detection will increase. Furthermore, certain operational procedures like rapid key changes and multiencryption can make the DES stronger.

Import/Export Issues

The U.S. government's policy (or lack of policy) with respect to importing and exporting cryptographic equipment has some intriguing aspects. Most of the major foreign suppliers of communications security equipment enjoy higher sales volumes in the U.S. than do American manufacturers. Even while domestic vendors are experiencing difficulty in achieving respectable sales levels in the domestic market, foreign vendors see tremendous potential here.

Many foreign vendors have expressed interest in acquiring DES chips in order to include this algorithm in their equipment for export to the U.S. Unfortunately, because of government restrictions, DES hardware is not approved for export unless a specific license is obtained, and such a license is not normally granted to overseas manufacturers. Licenses are currently granted for the specific-use application and not for incorporation into other nondomestic products.

This situation severely hampers domestic manufacturers' sales activi-

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ties, particularly in international business. Specifically, the International Traffic in Arms Regulations (Title 22, Code of Federal Regulations, Parts 121-128) require that a license be granted for export of all cryptographic equipment including the DES. What is interesting about this is that the DES algorithm has been well documented for several years now in publications issued by the U.S. Department of Commerce.

Contrasting Policies

Another interesting aspect of the export business is that many foreign countries require that the cryptographic key be given to a responsible government authority as a condition for the import of cryptographic equipment. However, foreign cryptographic equipment can be imported into the U.S. easily, often escaping any specific identification of the product as cryptographic equipment. The federal government has no organized program for tracking, on a regular basis, the types and applications of imported cryptographic equipment.

The restrictive export requirements, combined with very loose or nonexistent import regulations regarding cryptographic equipment, place U.S. manufacturers at an extreme disadvantage. On one hand, an agency of the U.S. government is encouraging the development and use of DES-based systems as a cryptographic standard for future nonclassified communications. Such a standard is sorely needed in order to ensure the orderly growth of communications security systems while maintaining interoperability.

On the other hand, other government agencies are in the business of discouraging the international use of DES-based systems by restricting the export of DES chips to be incorporated into communications security equipment manufactured in other countries.

Managers' Dilemma

Put yourself in the position of a telecommunications manager designing an international, multimillion-dollar communications network. You may find it unacceptable to use U.S.-manufactured cryptographic equipment because of the risk of not being able to obtain the appropriate license for export. Telecommunications managers are encouraged, for that matter almost pressured, to design a communications system that excludes domestic cryptographic equipment or does not include any security provisions.

Why does one agency of the federal government publish specific operating details of a cryptographic algorithm, while another agency restricts the export of cryptographic devices that implement widely published algorithms? Perhaps we have developed a unique approach to cryptographic hardware.

After all, who is to say we can manufacture the best cryptographic equipment when, for a long time now, the Swiss, Germans and English have had to cope with active terrorist groups and concentrated espionage activity? It is reasonable to assume that these vendors have developed adequate technology to protect against the bulk of the perceived threats of terrorist and limited-resource industrial espionage.

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The Flap Over DES

There has been much debate in the technical press and academia about the relative strength of the Data Encryption Standard (DES) cryptographic algorithm. This debate may have been stimulated by the way in which the final algorithm was approved. Cryptographers in particular have been suspicious of the motives of those responsible for evaluating the original algorithm design in light of the events leading up to what appeared to be a "weakening" of the original design.

The National Bureau of Standards (NBS) started development of the DES program in May 1973. NBS advertised in the *Federal Register*, seeking parties interested in submitting proposals for the standard. The successful bidder was IBM, which employed a scheme originally developed in 1970, more commonly called the Lucifer cipher. The Lucifer scheme employed a 128-bit algorithm, which was the basis for the first submission to NBS with only minor changes.

In March 1975, NBS invited comments from the government and public prior to adopting the modified Lucifer scheme as the standard. However, between the time the original scheme was submitted and the time it was advertised for final comment, the key length of 128 bits had been reduced to 64 bits — apparently reducing its strength by 50%.

The subsequent debate and formal Senate investigation resulted in the revelation that the National Security Agency (NSA) had improperly influenced the development of the DES. Since NSA is the only organization in the federal government that has any real expertise in cryptographic technology, the originally submitted algorithm had been given to that agency for review and comment.

The result was the reduction in key length, but the algorithm itself was not modified or changed. Consequently, IBM agreed that this key size still provided a more-than-adequate cryptographic capability for commercial applications. The only apparent advantage in reducing the key length is to provide certain operating efficiencies and increased throughput benefits.

Perhaps if the original submission of the Lucifer scheme had employed a 64-bit key and had then been accepted as the standard, the debate may not have arisen. Because NSA interceded by making a change that appeared to make the algorithm substantially weaker, without strong justification for the change, suspicions were aroused that NSA had some ulterior motive. After all, NSA is also in the business of intercepting communications that may involve national security as well as protecting the transmission of classified information.

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tion is provided by equipment manufactured in Sweden.

A number of remedies can be instituted to change this situation. In particular, we must have a national cryptographic policy with respect to the protection of nonclassified communications. This policy should deal with both the import and export of cryptographic equipment. Additional research should be encouraged in the public-key area, since it appears that public key offers the best alternative to resolving the troublesome key-management problems of existing equipment.

At the same time, other technologies or techniques for key management should be developed that would allow for true cryptographic communications standardization, while at the same time providing for interoperability.

We need a more realistic policy with respect to the export of DES hardware. Obviously, the government's approach of publishing the algorithm while not allowing the general export of hardware appears suspicious to many users and adds fuel to the speculation that the hardware implementation of DES contains some unique trap-door weakness.

For the short range, we need to keep track or require registration of all imported cryptographic equipment in order to measure how well foreign vendors are doing in the U.S. market. At best, we should be able to measure why foreign equipment is selected over domestic equipment and determine what impact government regulation has on selection criteria.

Finally, we need an intensified education program for specifically targeted multinational organizations to acquaint them with the problems and vulnerabilities of transborder data flow.

About the Author

J. Michael Nye is president and co-founder of Marketing Consultants International, Inc., located in Hagerstown, Md. The firm provides independent consulting services in speech processing and communications security. Services include strategic planning, product development and strategy, application research/implementation and new product pioneering.

Since 1979, Nye has worked closely with the National Telecommunications and Information Administration (NTIA) in the implementation of Presidential Directive 24. In this regard, he has published a users' guide on communications security issues and has conducted investigations into the vulnerability of facsimile and office automation technologies within the civil government.

Nye has published articles on the subject of communications security in a variety of technical publications and is the author of the recently introduced book Who, What & Where in Communications Security.

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Ease of Installation	3.0	3.0	2.5	2.5	1.5	1.3	2.30	1(Tie)
Ease of Use	3.1	2.9	2.5	2.3	2.0	1.7	2.42	1
Trouble Shooting	3.1	2.6	2.5	2.5	1.5	1.7	2.32	1
Documentation	3.3	2.9	1.5	2.3	2.5	1.0	2.25	1
User Education	3.2	2.4	2.5	2.3	2.0	1.7	2.35	1
Vendor's Maintenance	3.0	2.9	2.5	1.8	1.5	1.7	2.23	1
Overall Satisfaction	3.3	2.9	2.3	2.8	2.0	1.7	2.50	1
Composite Average	3.20	2.81	2.42	2.37	1.83	1.57	2.37	1

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Features 64K-Bit Chip

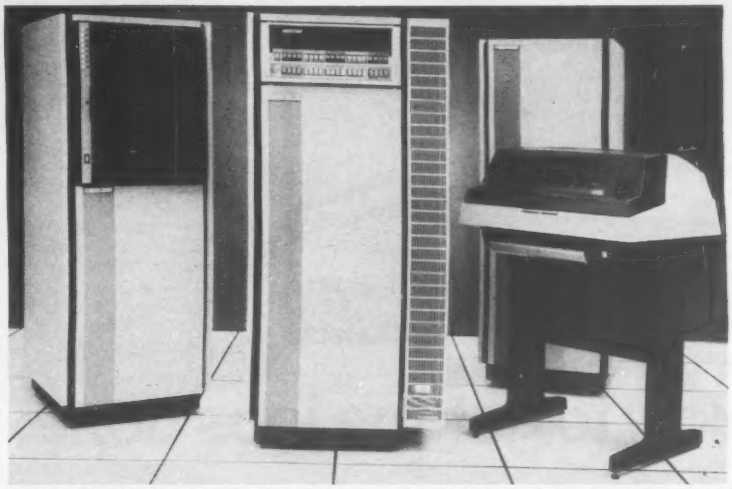
Modcomp Enhances 16-Bit Classic Line

FORT LAUDERDALE, Fla. — Modular Computer Systems, Inc. has expanded its Classic minicomputer line by adding a series of processors that feature 64K-bit chip technology and a maximum of 2M- to 4M bytes of memory.

The Classic II series is an extension of the firm's nearly four-year-old 16-bit Classic computer line. The updated series is said to be totally program compatible with the earlier computers.

The first system, the II/25, is a standalone processor that can also be used as a satellite system in a network. The system has an integral direct memory I/O processor that provides up to 16 multiplexer I/O channels, with transfer rates up to 1M byte/sec, the vendor said.

The processor is housed in a 19-in. cabinet with a four-slot chassis and is available in three models: the II/25-1, offering 128K bytes of memory; the II/25-2, with 256K bytes of memory; and the II/25-3, with 512K bytes of memory. The systems are priced from $18,900 to $27,300, including the firm's Max III operating systems software.



Modcomp's Classic II line offers processor configurations ranging from 128K- to 4M bytes of error-correcting semiconductor memory.

The Classic II/45 is a medium-scale computer that reportedly has an integral direct memory I/O processor and the ability to handle up to three I/O buses. Like the entry-level Classic II/25 systems, the II/45 has an integral processor that allows up to 16 multiplexer channels with data rates up to 1M byte/sec. However, in addition, the system can be fitted with a single or dual I/O bus processor option, which provides either 16 or 32 direct memory channels, a spokesman said.

The II/45 is available in four models — the II/45-2, II/45-3, II/45-4 and II/45-5 — offering memory from 256K- to 2M bytes. The II/45 has the capacity to be configured with additional memory and controllers and is available with a hardware floating-point option.

A communications processor option is also available, which provides communications users with a specialized instruction set for byte-string packing and unpacking and communications protocol usage. The processor also supports Modcomp's direct memory interface capability, offered on the firm's communications subsystems, the spokesman noted.

The II/45 systems cost from $34,500 to $67,200, including the firm's Max IV operating systems software.

The second group of systems, the II/55 series, consists of three medium-scale processors, all complemented with a high-speed extended arithmetic unit.

The II/55 systems feature memory up to 2M bytes and, like the II/45, also feature an integral I/O processor and a single or dual I/O bus option.

The extended arithmetic units, featured on these processors, make the systems applicable to applications requiring nigh computer performance, memory capacity and I/O throughput, the spokesman explained.

The II/55 systems cost from $60,000 for a 512K-byte processor to $85,100 for a 2M-byte system. These prices include the firm's Max IV operating systems software.

Finally, the firm unveiled its high-performance Classic II/75 minicomputer, which reportedly features a memory capability of up to 4M bytes.

The II/75, like the II/55, has as standard equipment an extended arithmetic unit. However, the systems integral I/O bus processor provides up to 32 multiplexer I/

(Continued on Page 50)

Tandem Adds Tape, Disk Drive To Its Nonstop Line of Minis

CUPERTINO, Calif. — Tandem Computers, Inc. has announced a tape and disk drive for its Nonstop line of minicomputers.

The 5106, a 6,250 bit/in. group-coded recording (GCR) tridensity tape drive, accommodates 800 bit/in. and 1,600 bit/in. formats. The unit features double-track error detection and can be used on both Nonstop and Nonstop II processors. The unit costs $29,500 alone and $47,500 with a formatter, the vendor said.

Tandem also announced the 4116, a random-access, nonremovable Winchester disk drive that features a capacity of 540M bytes of formatted storage. The unit is intended for users of the Nonstop II system who need extra storage for large data bases. Four 4116 drives can be attached to a controller for a total of 2.16G bytes.

The unit costs $39,500 and is available only for the Nonstop II, the vendor said from 19333 Vallco Pkwy., Cupertino, Calif. 95014

Televideo Expands Storage Of TS/806 With Disk Drives

SUNNYVALE, Calif. — Televideo Systems, Inc. has introduced two disk drives designed to expand the storage capacity of its TS/806 multiuser business computer.

They are the TS/806S, a 5¼-in. Winchester disk drive said to double a system's on-line storage capacity by providing an additional 9.8M bytes of unformatted memory or 7.4M bytes of formatted memory, and the TS/806C, a ¼-in. magnetic tape cartridge unit said to provide 17.2M bytes of backup tape storage.

With the TS/806H disk drive all data files are on-line for quick retrieval and information storage; users do not need to off-load data to make room for more, the vendor said. The TS/806C provides for off-line, off-loading backup the TS/806's integrated hard disk, the vendor said.

Also said to be standard are two RS-232C serial ports to interface with RS-232C-compatible printers or modems running on CP/M.

The TS/806 is a multitasking, multiprocessor system designed for business applications. The system supports up to six intelligent satellite user stations and is configured with Zilog, Inc.'s Z80A microprocessor; 64K bytes of random-access memory; a single 500K-byte minidiskette; a 10M-byte, 5¼-in. Winchester disk drive; and Televideo's CP/M-based Mmmost operating system supervisor.

Price for the TS/806C is $3,995, while the TS/806H is $3,600. Both are available from Televideo Systems, 1170 Morse Ave., Sunnyvale, Calif. 94086.

Printer Works at 6 Sec/24-Line CRT Page

TARRYTOWN, N.Y. — A thermal printer that can reportedly produce a 24-line CRT screen page in less than 6 sec was announced here by Olivetti Peripheral Equipment S.p.A.

The unit, called TH 240P, features a parallel interface for any standard serial port and both alphanumeric and graphics capabilities. The printing mechanism handles 80 char. lines at 240 line/min or 320 char./sec. The printing process uses heat-sensitive paper and is silent, an Olivetti spokesman said.

The TH 240P is available for $840 from Olivetti at 505 White Plains Road, Tarrytown, N.Y. 10590.

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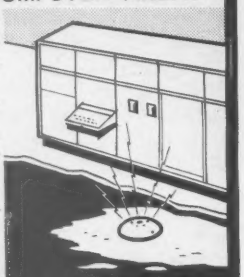

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Console Controller Interfaces LCD to Standard Computer

LOS ALTOS, Calif. — A plug-in console controller that reportedly allows users of single-board or RS-232C-based computer systems to replace their standard CRT terminals with liquid-crystal displays (LCD) is available from Cybernetic Micro Systems, Inc.

The CY300 reportedly interfaces a 16-char. dot matrix LCD and keyboard to any standard computer. The unit contains a character generator containing 64 Ascii char. and a random-access memory buffer that will accept and transmit up to 30 char.

Available in June, the CY300 costs $65 with volume discounts available from the vendor, 445-203 S. San Antonio Road, Los Altos, Calif. 94022.

Matrix Printer Connects To IBM System/34, /38

TUSTIN, Calif. — General Business Technology, Inc. has introduced the GBT 5207MP matrix printer for the IBM System/34 and System/38. It features bidirectional printing at 120 char./sec, the vendor said.

The printer connects to the IBM system via the standard twin-axial cable either locally or at remote sites. It is said to provide a host-selectable pitch of 5-, 10- or 16.5 char./in. allowing 198 char./line or a full 132-col report on 8½-in. by 11-in. paper.

It sells for $2,995 from General Business Technology, 2630 Walnut Ave., Tustin, Calif. 92680.

Intelligent Terminal Offers Graphics, Computing Ability

WALTHAM, Mass. — Modgraph, Inc. has introduced a high-resolution intelligent terminal that is said to provide powerful interactive graphics and computing capabilities as well as an alphanumeric overlay.

The G-100 graphics terminal features a choice of viewable resolutions, a 15-in. green phosper screen and graphics function keys. With the addition of an optional floppy disk drive and controller, it has full Digital Research, Inc. CP/M capability, the vendor said. It costs $2,895 from Modgraph, 235 Bear Hill Road, Waltham, Mass. 02154.

Apple III Users Offered Parallel Interface Chip

CORONA, Calif. — Elcom Systems Peripherals, Inc. has announced the Burtronix Protocard III, an interface card for the Apple Computer, Inc. Apple III microcomputer.

The Protocard III allows Apple III users to interface with a parallel interface chip, the 6522 produced by MOS Technology, Inc. The chip is attached to the Apple III hardware bus. The interface card costs $195, the vendor said from Suite A, 439 Harrison St., Corona, Calif. 91720.

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Classic Line Enhanced

(Continued from Page 49)

O channels with throughput rates up to 4M byte/sec. In addition, the single or dual I/O bus option can be added to provide a total of 48 or 64 mapped direct memory I/O channels for a maximum I/O throughput rate of 8M byte/sec, the spokesman said.

The II/75 also features four-way interleaving, which is said to deliver processor cycle times as low as 125 nsec. Also, memory expansion options are available to configure load-sharing and redundant CPU and memory architectures.

The high-end system is available in two basic memory configurations: a 1M-byte model for $84,600 and a 2M-byte version for $101,600. The firm's Max IV operating systems software is included.

All of the Classic computers will be available late this month from Modcomp, P.O. Box 6099, 1650 W. McNab Road, Fort Lauderdale, Fla. 33310.

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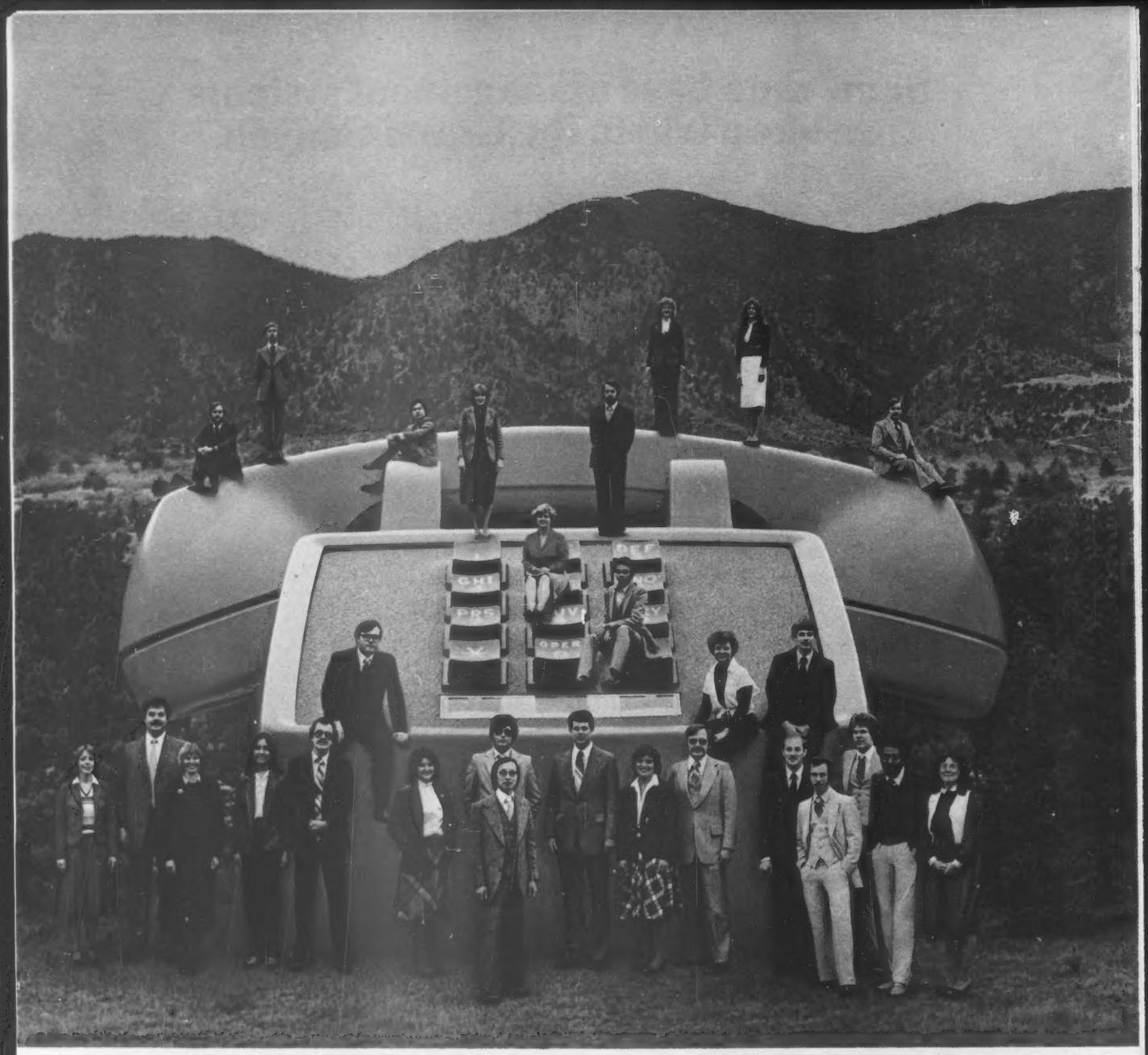

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9 to 5 President Raps Office Automation, Says It Deskills, Devalues Office Jobs

The organization known as 9 to 5 gained widespread publicity when the film by the same name flashed across movie screens nationwide. Jane Fonda, Dolly Parton and Lily Tomlin were portrayed as officebound slaves to a sexist boss on whom they eventually avenged themselves.

In reality, there are 12,000 members of 9 to 5 in 12 cities nationwide who may or may not feel that way about their bosses. The organization was first formed in Boston in 1973. It went national under the name Working Women and just recently dropped that appellation in favor of 9 to 5 National Association of Working Women.

Karen Nussbaum has been president of the organization since 1977. She recently took time to talk to Bruce Hoard, Computerworld's Senior Editor/ Office Automation, about her feelings on office automation.

CW: What is 9 to 5's reason for being?

Nussbaum: 9 to 5 exists in order to win rights and respect for women office workers. Office workers have been unorganized and unrepresented for a long time, and with the start of the Working Women's Organization in the early '70s, we created a new form of organization to respond to our concerns and needs.

CW: How would you describe your organization's philosophy toward office automation?

Nussbaum: We think that automation in itself is neutral. What we're concerned about is the way it's being implemented. Automation could enhance the jobs of office workers and in some cases does, but overall the major trend in automation is to deskill, devalue and downgrade office jobs. We're concerned both about the design of the machine and the design of the new jobs that will occur.

CW: What is right about the way office automation is being implemented now? Are there any cases in which you approve of the way it's being done?

Nussbaum: Certainly in a number of companies there are individual office workers whose jobs are made better by new technology. No secretary wants to type endlessly the same forms or the same documents and manuscripts. The ability to easily correct or make changes in documents is certainly one that we all welcome. That's good for the most part, but office automation enhances only a small number of jobs and instead what happens is that huge numbers of jobs — millions of new jobs that are created — are highly routine, are paced by the machine instead of paced by humans and have very limited intrinsic value or interest with very limited natural job training or ability to advance.

CW: Has office automation reached a point yet where women office workers are really feeling the effects of it, or is it still developing and not really creating an impact on them?

Nussbaum: Oh, I think very definitely you're beginning to see the effect on women office workers because of automation. Recent studies show that women office workers, particularly at automated jobs, have a very high level of stress. The 1980 Framingham [Mass.] Heart Study showed that female clericals with children and blue-collar husbands had a heart disease rate that was twice as high as that of men, and the 1981 Niosh [National Institute for Occupational Safety and Health] study found that clericals who work full-time with VDTs [display terminals] have the highest rate of stress ever recorded and that's higher even than air traffic controllers. The problems that we face are not just simple ones or ones that are wishful. The problems that we face because of automation have very serious consequences on our health and well-being. And I think you're beginning to see the resistance to automation. The resistance is both unorganized in the form of extremely high turnover rates in highly automated jobs and then fairly well organized, too. The best example is the strikes a few years ago by 500 secretaries at the United Nations who walked off their jobs for a week when they found that they were suddenly automated.

CW: What is 9 to 5 doing to actively redress the wrongs of office automation?

Nussbaum: The first and most important thing is to raise the public debate on it. I think for far too long office automation has just been seen as a simple technical issue, something that is only in the realm of experts from computer vendors and the computer industry to talk about. But as we've begun to raise it as a public issue, we've deliberately raised it as a question that is not an expert or technical question alone.

There are real social choices that are made, choices that affect millions of people, and the social consequences of those choices have to be taken into consideration.

CW: Is there any reason to believe that women office workers are affected differently by office automation than male office workers?

Nussbaum: Only to the degree that stress is a bigger problem for womem than it is for men because they work two jobs for the most part, a paid job in the paid labor force and then another job at home.

CW: That's assuming we're talking about "unliberated males."

Nussbaum: Liberated or not, the statistics are that men work an average of 50 hours a week if you include work at home, and women average 80 hours a week.

CW: Where do those statistics come from?

Nussbaum: These are Department of Labor statistics quoted in Dr. Jean Stellman's book, *Women's Health, Women's Work.*

CW: How serious an issue is job displacement in relation to office automation?

Nussbaum: I think it's an extremely serious problem, one that's masked right now. The overall expansion of the

(Continued on Page 54)

CW Interviews Karen Nussbaum of 9 to 5

(Continued from Page 53)

clerical work force covers over the job displacement because of automation, but the chickens will come home to roost in about 15 or 20 years. Then we'll have a problem that won't just affect office workers but our entire society.

So far, most job displacement because of automation is in manufacturing. Jobs lost in manufacturing because of automation have been replaced by clerical and service jobs. I think there's going to be a limit to the expansion of clerical and service jobs, and then what are the jobs that Americans are going to do?

European studies predict job losses in the clerical industry of 15% to 20% in the next 10 to 20 years. This country isn't even making estimates about what the job displacement is going to be because of automation. I think this is a profound question that deserves serious study and consideration.

CW: What opportunities does office automation present to office workers?

Nussbaum: Office automation could eliminate bad jobs. It could eliminate repetitious work and enhance jobs. But it all depends on how the jobs are designed. And that's a question that has to be talked about both by management and by the workers and their representatives.

CW: How does management usually react to 9 to 5?

Nussbaum (laughing): Well, I've never met someone in management who chooses to involve workers voluntarily in considerations about work. Management has been reluctant to engage us in a good conversation about automation or about anything else — that's why we're organized. It's not a question of persuasion but a question of pressure and change.

CW: If you were in charge of an office and you were going to automate that office, what path would you follow?

Nussbaum: First of all, I'd talk to the people who do the work and find out what sense automation could make in the real worklife of my company. Far too often automation is imposed from an abstract point of view and that's often why it fails. It's just not done with the involvement of the people who are actually performing the jobs. I think that should be the first step of any company that automates.

CW: So under certain conditions, if implemented properly, office automation can be a boon to productivity and be well accepted by workers?

'I don't offhand . . . know of a company that's automated in the kind of way that promotes job enrichment.'

Nussbaum: Absolutely. No question about it.

CW: Do you know of any companies that have been successful in your estimation?

Nussbaum: I don't offhand . . . know of a company that's automated in the kind of way that promotes job enrichment, that allows for job training and career ladders that also protects the health and well-being of office workers, although I'm sure they exist. Certainly the experience in Europe, particularly Scandinavia, is a very positive example that American companies should be looking at. I did hear just the other day that there is a company that is now calling for rest breaks after every hour of work on a display terminal; I think that should be a minimum standard for all companies.

CW: Are there any big lies we are commonly told about office automation?

Nussbaum: I think there is an aura of science fiction-like rhetoric that surrounds the office of the future, but to us the office of the future looks very much like the factory of the past, the way it's being implemented. There's nothing all that new about shift work, piece work, which is what pay per line of information is. Or pay by keystroke homework, that's a step back into the Middle Ages, if you ask me, and into the cottage industries.

This isn't new, this is all pretty old stuff and maybe it's being done on new machines, but the consequences are the same for the people who perform the work. That's why we're concerned and that's why we think that these questions have to be looked at now — before automation is an accomplished fact.

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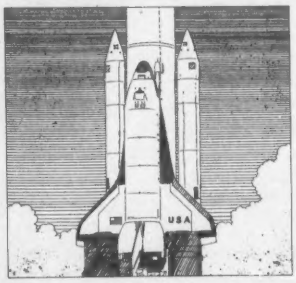

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Through Second Quarter

Dollar Gains Shave IBM Earnings: Opel

By Marcia Blumenthal
CW Staff

JACKSONVILLE, Fla. — Although IBM is watchful of the "uncertain" world economic situation, John R. Opel, the firm's president and chief executive officer, said the strong showing of the U.S. dollar against foreign currencies, rather than the economy, will continue to have a significant negative effect on the firm's earnings, at least through the second quarter.

Noting that today the U.S. dollar is 12% stronger than the German mark, 24% ahead of the French franc and 14% stronger than the Japanese yen than it was at the same time last year, Opel told shareholders gathered here for the firm's annual meeting last week that earnings could be "depressed for the full year" if the dollar posts further gains on world money markets.

During a brief impromptu meeting with the press after the meeting, Opel said he did not want to give the idea that the information processing industry was recession-proof, but he did note that new technological cycles can result in healthy growth for an organization "even when economic forces are running in the opposite direction."

Despite prospects of continued slow earnings growth, just prior to the meeting, IBM's board of directors voted to declare a regular 86-cent-per-share quarterly cash dividend on June 10 to shareholders of record on May 12.

While some stockholders observed the dividend has not increased for the past three years, Opel told the nearly 1,000 shareholders attending the meeting that the firm pays out 61% of its earnings to stockholders.

Labeling 1981 as a "reasonably good year" for IBM, which saw the beginning of a payoff from major capacity increases, Opel

(Continued on Page 58)

Aggressive IBM Australia Offers Big Discounts

By Susan Coleman
Special to CW‡

MELBOURNE, Australia — IBM Australia has begun an aggressive new marketing approach here that features discounts to selected customers — reductions said to be the largest IBM has offered.

While IBM claimed it has always offered volume discounts, the size of recent "allowances" has increased dramatically.

In one case, the decision by Myer Emporium Ltd., Australia's biggest department store chain, to make IBM its preferred supplier resulted in a deal that is said to give the retailer $14.7 million more in goods and services, if it spends $47 million between now and 1985. In another case, a large IBM user that declined to be named reported that IBM offered it a discount over and above the usual volume procurement discount in a multimillion-dollar deal involving visual display terminals.

The tougher marketing approach by IBM in Australia follows closely the decision by the U.S. Department of Justice to drop its antitrust suit against the corporation, observers noted.

(Continued on Page 58)

Honeywell to Sell Part Of CII-Bull for $150M

MINNEAPOLIS — Responding to France's move to nationalize that country's information processing industry, Honeywell, Inc. agreed in principle late last month to allow the holding company for CII-Honeywell Bull (CII-HB) to buy out the majority of Honeywell's interest in the French computer manufacturer for about $150 million.

When that agreement is finalized, Honeywell's share of CII-HB will be reduced from 47% to 19.9%. A date has not been set for the final agreement between Honeywell and the French parties.

Under the terms of the 1975 merger agreement that Honeywell signed with Compagnie des Machines Bull (CMB), the firm could reportedly sell its interest in CII-HB if any of the French firm's indirect shareholders were nationalized. Nationalized two months ago, Saint-Gobain had a 51% interest in CMB, which in turn, holds a majority interest in CII-HB.

Honeywell said its technical and distribution arrangements with CII-HB will remain the same as before the nationalization. CII-HB manufactures Honeywell DPS 7 systems.

Army Awards DP Update Contract

FORT BELVOIR, Va. — The U.S. Army has awarded a $656 million, 10-year contract to update its DP operation to Electronic Data Systems Corp. (EDS).

The project, called Vertical Installation Automation Baseline (Viable), will give the Army the same kind of advanced computer technology used in private industry today, according to Col. Clinton H. Black, project manager for Viable. The current technology used for Army data processing dates back to the late 1960s.

The contract calls for EDS to establish five regional large-scale processing centers to support 44 distributed processing centers operated by the army. Each local user will have access to computer software packages and data sets from its main regional center.

Vendors Chosen

Each of the five regional centers will have multiple Amdahl Corp. 470 CPUs, Storage Technology Corp. disks and printers and NCR Corp.'s Comten front-end processors. This hardware will interface with IBM 4331s at the various local sites.

Applied Data Research, Inc. said it is the leading software products subcontractor for the project, with about $14 million in revenues to go to the company during the life of the contract.

The contract award for the first year of the project is $16.6 million, the Army said. The planning, evaluation and testing of various contract proposals took five years and involved more than 100 military and civilian computer experts.

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Strong Dollar Will Hold IBM's Earnings Down: Opel

(Continued from Page 57)

said the firm's stock was undervalued and earnings do not adequately reflect the positive growth in business activity IBM experienced last year.

Opel restated IBM's intention to compete in all segments of the information industry. "IBM today has a variety of businesses within the company ... some just emerging and some mature ... but all are quick on their feet and soundly financed internally." He added that "it is with this variety of related businesses that we intend to compete across the industry throughout this decade."

He pointed out that during the past six years the firm has spent $7.9 billion on research and development and $9.2 billion on property, plants and equipment with an eye towards sustaining the firm's competitive position across a broad spectrum of the information industry. Last year alone, the firm added 10,000 employees in the U.S., he noted.

Responding to one shareholder's question on how extensive IBM's foray into robotics would be, Opel first hedged on speculating about IBM's view of its position in this emerging market. However, letting down his guard slightly, he responded "wherever that industry is [during the next decade], we hope to play a major role [in it]."

In addition, Opel disclosed the firm has already concluded some agreements with distributors other than Sears Roebuck & Co. and Computerland retail outlets for selling its personal computer and was examining other arrangements.

Other than calling it a "real vindication" and commending the lawyers involved in the case, Opel had little to say about the dropping of the U.S. Justice Department's suit against the firm in January. He also had few words about the specter of competition from AT&T.

With regard to Japan, Opel said while Japanese firms are formidable competitors, they are not "supermen."

As in past meetings, a good deal of time was spent on a shareholder's proposal that IBM withdraw its business from South Africa. One shareholder suggested the company do the same for the government of Argentina. However, the South African proposal garnered only about 2.5% of the favorable vote of shareholders, about the same percentage as last year.

Without revealing specific instances, Opel said the firm has refused sales to South African entities because it suspected the equipment would be used for repressive purposes within the country.

IBM Australia Institutes Tougher Marketing Plan

(Continued from Page 57)

That decision to drop the suit does not have a great deal of legal relevance in Australia because of the practical difficulty of mounting a case from the U.S. However, it is seen to have spurred the corporation toward applying more aggressive marketing techniques.

In recent years IBM has lost a number of its major accounts in Australia to plug-compatible rivals. With the Myer deal, it is some of those very rivals — Amdahl Corp., NCR Corp. and Storage Technology of Australia Pty. Ltd. — that have now been frozen out.

Rejecting IBM's action as having any relevance to the antitrust decision, Brian Finn, IBM Australia's managing director, said: "Myer specified an extremely unusual strategic plan — it was larger than any other single proposal — and we figured it accordingly. And we will be looking at other [arrangements] as we go through time."

He declined to comment on the details of the arrangements with Myer except to say that the contract had not yet been written.

Finn declined to confirm whether the discount to Myer was the largest ever given by IBM worldwide.

However, "it's the biggest single proposal response that IBM Australia has ever made," he said. "It indicates we continue to do our best to be totally responsive to our customer."

Finn declined to name any other large IBM accounts to which special discounts have been applied. According to industry sources, IBM has offered Myer a discount of more than 25%, effectively enlarging the department store chain's purchasing power to about $63 million.

Myer will eventually have a computer network comprised of several very large mainframes, network processors and 7,000 to 9,000 terminals.

Coleman is editor of Australasian Computerworld.

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Mini Will Cash in Its Chips In 1980s, Imlay Forecasts

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — The 1980s will see the death of the minicomputer — a cause for celebration rather than regret, according to John Imlay, chief executive of Management Science America Corp. (MSA).

In a recent speech to the Peachware '82 software conference here, Imlay said the minicomputer portion of the computer industry will be squeezed to death by both the microcomputer and mainframe vendors. However, the death of the mini will not affect anyone in the software industry, he added.

Imlay forecast that two categories of computers would arise out of the ashes of the mini. These were the monocomputer, resulting from the movement of micros into traditional mini markets, and the multicomputer, which would be a derivative of the mainframe as it became available to users further down the market.

Imlay argued there is already evidence to show that this convergence is happening. Both Hewlett-Packard Co. and IBM are entering the micro arena. Following the IBM announcement of a 4321 last November, Imlay forecast that within the next 18 months, IBM will come out with a 4311, a 4306 and a 4301 mainframe, each costing less than $40,000. "The traditional line of minicomputer business is under extreme pressure," he asserted.

Imlay argued that computers are becoming a commodity just like electricity. Part of the impetus to this was the role computers are now playing in schools. Children are becoming very well versed in the technology, he said, and this will have an impact on the shortage of skilled programmers. "I don't see a labor shortage as a major long-term problem."

The proliferation of computing technology will depend greatly on the advances of communications technology. "The information technologies of the future will have to know computers, communications and systems to be successful," he said.

Imlay maintained that the entrance of AT&T into the computer market means that the biggest revolution in information processing will come in the area of communications.

"Through Bell Labs, AT&T has all the technical advances needed to compete in the computer field. They will be a major factor in this business as we see AT&T computers coming on-line." Bell's great technological ability, Imlay said, will penetrate the industry more rapidly than was formerly envisioned, beginning with the intelligent telephone.

He predicted the coming battle between AT&T and IBM would result in dramatically lowered costs for the end user.

These developments will also affect office technology. Word processing, for example, will have to grow far beyond what it is today to connect with the central processor in an organization. As a result, word processing may be a phrase that soon leaves the computing vocabulary as it becomes inadequate.

Expansions

Computervision, Corp. will locate a plant in the Nancy-Brabois technological park in France. This is the company's first large industrial commitment in Europe.

Printronix, Inc. has opened new headquarters, consolidating corporate and marketing activities at one location. The five-building complex is located at 17500 Cartwright Road, P.O. Box 19559, Irvine, Calif. 92713.

Univac Restructures Product Division

BLUE BELL, Pa. — Sperry Univac has restructured its Product Division, creating four new divisions.

The divisions — Hardware Products Division, Software Products Division, Communications and Terminals Products Division and System Management Division — will each be directed by a vice-president and general manager.

The Hardware Products Division, headed by R.C. Phillips, will be responsible for all systems hardware development; the Semiconductor Division in Eagan, Mich.; the ISS disk operation in Santa Clara, Calif.; and certain factory operations.

The Software Products Division, headed by Donald O. Neddenriep, will consolidate all software development activity presently being done in Roseville, Minn.; Blue Bell, Pa.; Salt Lake City, Utah; and London, England.

The Communications and Terminals Division, headed by Hatim A. Tyabji, will be headquartered in Salt Lake City and will consolidate all hardware development and manufacturing activities for those products and will oversee the activities of the minicomputer operation.

The Systems Management Division, headed by Frank B. Holst, will be responsible for ensuring hardware and software compatibility.

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Then our NCC Show Issue comes out June 7th, the day of the show. It will have last-minute show information, speech previews and other show details. Pick up a copy at the *Computerworld* booth. Black and white ad close is May 27th*. Color close is May 21st.

Finally, our June 14th NCC Wrap-Up Issue will have complete coverage of all that happened, prepared by our 35-person editorial staff. You'll read who said what, who introduced what and how it works, and review the show's features and highlights in words and pictures. Black and white ad close is June 4th. Color close is May 28th.

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Canada's Datacrown Opens First U.S. Center

SILVER SPRING, Md. — Datacrown, Inc., one of Canada's largest DP services firms, last month opened its first U.S. computer center to serve its U.S. customers.

With one IBM 370/168 system already in operation and another scheduled for installation later this year, the facility here can be expanded to four IBM 3081s and will eventually contribute $70 million to $80 million in revenues for the company, Datacrown said. The company has computer centers in Toronto and Ottawa.

Datacrown President Richard G. Taylor explained the $10 million facility was located in this Washington, D.C., suburb in order to be centrally situated between the firm's Boston and Atlanta regional offices. A Washington, D.C., presence also helps the company attract U.S. government clients, he said.

The firm presently has 60 U.S. clients, including ITT, Olivetti, the Social Security Administration and the Department of Housing and Urban Development. Ten percent of Datacrown's current revenues are from U.S. customers, Taylor said, adding "we think our growth in the U.S. will be very rapid."

A subsidiary of Crown Life Insurance Co., Datacrown describes itself as one of IBM's top five Canadian customers. Datacrown revenues for 1982 are projected at $100 million.

The all IBM-compatible facility here includes Storage Technology Corp. tape drives for the 100,000-reel-capacity operation and Storage Technology and Memorex Corp. disk drives. With a technical staff of 47, the center will eventually employ about 150 computer personnel, all locally recruited, Taylor said.

He suggested this U.S. center will help the company attract American customers who might have balked at having their data processed in Canada. He described Canadian government efforts to force domestic processing of Canadian data as "paranoia" and urged the U.S.-Canadian border "be kept open, with the freest possible exchange of investment, culture and skills."

Program Helps Textronix Users Find Software

BEAVERTON, Ore. — Tektronix, Inc. has announced a program designed to help its users find the appropriate software for Tektronix's line of terminals, printers and graphics systems.

The Tektronix Solution Directed Marketing Program is basically the compilation of a list of software vendors that Tektronix considers to provide high-quality software, which works well with Tektronix systems.

Tektronix will identify, evaluate and integrate the third-party software into its sales structure. Pat O'Brien, the firm's marketing manager, said users will still purchase the software directly from the vendor and deal with the software house on all maintenance issues. In addition, Tektronix will not support the third-party software if the vendor goes out of business, he added.

Initial packages Tektronix plans to identify include computer-aided design, cartography, computer-aided manufacturing and technical data analysis, according to O'Brien.

CDC,Csus Offer Plato-Based Study

SACRAMENTO, Calif. — Under a $1.4 million agreement with Control Data Corp., the California State University at Sacramento (Csus) will develop courses in CDC's Plato-based education system for use by schools, colleges, universities, correctional institutions and other educational and state agencies in California and Nevada.

Courses will include high-school skills, engineering, music, nursing and English as a second language, John Myles of Csus, said.

More information is available from Csus, University Relations Office, 6000 J St., Sacramento, Calif. 95819.

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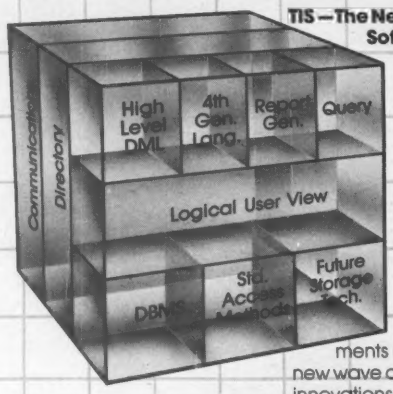

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- The DBMS facility features hybrid relational data structures and virtual data base processing—with up to 95% of

DP Consortium to Serve Large Metro Areas

DES MOINES, Iowa — Datacraft Information Services, Inc., a data communications consulting company, has launched an effort to establish a consortium of independent data processing firms in areas with a metropolitan population of 100,000 or over. The consortium will establish a specialized common-carrier service for private-line data communications.

Each firm will become part of the nationwide network, a DataCraft spokesman said, bringing the network to the local user. The typical firm will already be providing some type of data processing function within their community such as a service bureau. Others may be a software house, OEM or retail store.

An organizational meeting of the consortium will be held later this spring, the spokeman said.

The service will be offered to a number of cities during the fourth quarter of 1982 or the first quarter of 1983 with all 264 of the metropolitan areas becoming operational as firms join the consortium.

DataCraft Information Services, Inc. is located at 2521 Kenway Drive, Des Moines, Iowa 50310.

Five Harris Groups Gain Sector Status

MELBOURNE, Fla. — Harris Corp. has elevated five former business groups to sector status, formed an operating group headquartered in Dallas and established three new divisions, according to a recent announcement.

The business sectors, which will be headed by senior vice-presidents, are Information Systems, headed by Jack Davis; Communication, led by John Lemasters; Semiconductor, headed by Michael Maguire; Government Systems, headed by Frank Lewis; and Printing Equipment, under the direction of James Pruitt.

The newly formed operating group, Information Terminals, will be headed by Vice-President Eliott James.

The three divisions, to be managed by vice-presidents, are the Interactive Products Division, headed by David Evans; the Distributed Data Processing Division, headed by J. Whitney Haney; and the Word Processing Division, headed by James Oyler.

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New Companies

Jupiter Systems, Inc. is a new firm specializing in the development and manufacture of a line of sophisticated color graphics terminals. It is located at 2126 Sixth St., Berkeley, Calif. 94710.

Software Plus, Inc. is a new company providing a complete line of software products and services to users of small to medium-size IBM computers. It is located in the Meadows Office Complex, 301 Rt. 17 N., Rutherford, N.J. 07070.

Pace Data, Inc. is a new company that will develop, maintain and distribute programs and programming services for IBM System/23, System/34 and System/38 users. It is located at Suite 340, 22900 Ventura Blvd., Woodland Hills, Calif. 91364.

Software Systems, Inc. is a new company specializing in commerical applications for the smaller Digital Equipment Corp. computers, particularly the PDP-11, Decmate models. Company offices are at 15 Spinning Wheel Road, Hinsdale, Ill. 60521.

RRR (3R) Computers, Inc. is a new company that will design, manufacture, market and service desktop computer systems for science, industry and business. 3R is located at 18 Lyman St., Westboro, Mass. 01581.

Academy Computer Services, Inc. is a new company providing software and consulting services for all types of computer users. It is located at Suite 235, 4080 Woodcock Drive, Jacksonville, Fla. 32207.

Supershorts

AM International, Inc. has filed a petition for reorganization under Chapter 11 of the Federal Bankruptcy Code in U.S. District Court. Its Canadian subsidiary has filed similar action under Canada's bankruptcy act.

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Data General Corp. has donated an Eclipse MV/8000 computer system, valued at more than $230,000, to the computer science department of the University of Southern California at Los Angeles.

— — —

Cipher Data Products, Inc. is terminating its line of fixed and combination fixed/removable Winchester 8-in. cartridge disk drives in order to concentrate on its streaming tape technology. Cipher is pursuing alternatives for disposition of the disk technology, acquired in December with the assets of the Memory Products Division of Perkin-Elmer Corp.

— — —

Delta Data Systems Corp. has formed a new division, the Delta Data Service Co., as part of a major expansion of its customer service business.

— — —

Okidata Corp. has begun a yearlong phaseout of its CP210 passbook printer in order to concentrate on higher volume products such as its Microline family. Production will continue until March 1983 and parts and service will be provided for five years after the end of production.

IBM Not Expected to Take Market Lead, Recent Graphics Industry Studies Report

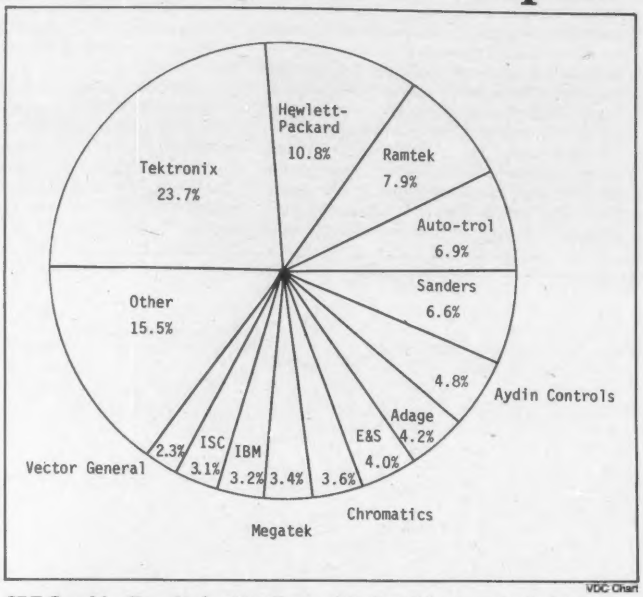
WELLESLEY, Mass. — IBM will not become one of the leaders in the computer graphics industry, according to two recent studies compiled by Venture Development Corp. (VDC).

VDC's study titled *The CRT Graphics Terminal Industry: A Strategic Analysis* found IBM with only a 3.2% share of 1981 industry graphics terminal revenues. These sales covered its 3279 color raster-scan terminal. The only other IBM graphics display terminal, the 3250, is purchased on an OEM basis from Sanders Associates and was not included in IBM's share of the market.

In *The Hard-Copy Graphics Industry* study, VDC found that IBM has less than 1% of the 1981 industry hard-copy graphics revenues, selling only the 3287 color graphics printer, which uses an impact dot matrix technology. VDC does expect this product to succeed, but IBM "will not be a threat to the leading pen-plotter and electrostatic printer/plotter manufacturers," according to the report.

In the past, IBM has been able to enter rapidly growing markets and quickly become one of the industry leaders, but this does not appear to be the case with graphics terminals, according to the report.

The studies cost $2,490 each and can be obtained from VDC at One Washington St., Wellesley, Mass. 02181.



CRT Graphics Terminals: 1981 Share of Dollar Shipments by Industry Participant (Percent of Dollars)

Nickels & Dimes

Alphacom, Inc. has recently completed an agreement with **Churchill International** of San Francisco for $1.75 million of venture capital funding.

$ $ $

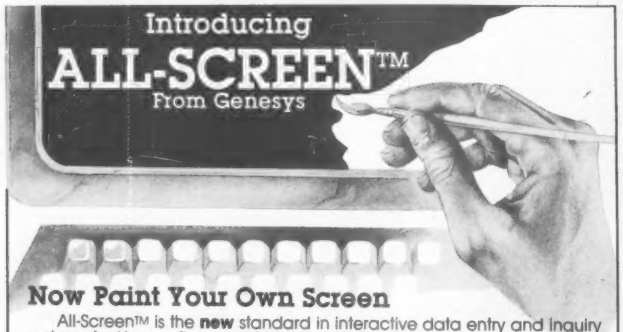
Compucorp plans to file a registration statement during its second quarter with the Securities and Exchange Commission covering a proposed offering of 800,000 shares, of which approximately 600,000 shares will be offered by the company.

$ $ $

Convergent Technologies, Inc. has filed a registration statement with the Securities and Exchange Commission covering 4,400,000 shares of its common stock being offered by the company.

$ $ $

Wells Fargo Bank has granted an $8 million unsecured prime line of credit to **Data Electronics, Inc.**



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Study: High-Tech Boom Poses Threat to Calif.

By Robert Batt
CW West Coast Bureau

SACRAMENTO, Calif. — New technology is both an opportunity and a threat to the California economy, according to a study prepared by SRI International, Inc. Handling displaced workers while assisting the growth of new industry will be an increasingly serious challenge in the state's economy during the next decade.

The impact of technology in the 1980s will be far more pronounced on the work force than it will be on the manufacturers of technology, a report just released here claims.

The report, "California's Technological Future: Emerging Economic Opportunities in the 1980s," says that technology will impact a wide range of occupations, changing both the type of work and the training required.

SRI described California as having an "emerging industrial-information economy." Through new technology, the proportion of effort, investment and the amount of information generated for use in the state's industry and agriculture is rising rapidly.

Developments in robotics and computer-aided design and manufacturing are likely to displace thousands of workers from some manufacturing jobs.

Some of the factors affecting California as a center of high-technology include:

• The need for strong universities. This is currently threatened, the report says, by state and federal cutbacks. California's educational system, bound by seniority rules and rigid pay scales, according to the report, will find it increasingly difficult to attract and retain competent teachers of technology.

• A strong venture capital market. This is rapidly expanding as a result of changes in state and federal tax laws.

• An attractive environment for recruiting workers. The chief impediment here is the high housing costs.

The report concludes that because California is likely to grow as a technological leader, its employment prospects are healthy at least until 1990. However, the period will be a volatile one as the rate of change among and within industries changes at a fast clip.

In an associated report on the "California Economy 1970-1990," prepared by the Center for Continuing Study of the California Economy, based in Palo Alto, Calif., computer manufacturing is projected to show the largest gain of any high-technology industry in the state.

Computer manufacturing is forecast to provide 65,900 new jobs during this decade — a 67.9% increase over the 1970s.

High-technology jobs increased by 80.3% in California during the 1970s and by 1980 the sector contained nearly 500,000 jobs or approximately 5% of the state's total employment.

Both reports are available from the Department of Economic and Business Development, Suite 200, 1030 13th St., Sacramento, Calif. 95814.

Executive Corner

• Jens P. Christensen has been appointed president of Heritage Computer Corp.

• Stephen B. Braun has been named president of Timberline Information Processing Supplies, a newly formed subsidiary of Timberline Systems, Inc., and Thomas P. Cox has been named vice-president, finance, of Timberline Systems.

• John M. Lee has been elected chairman of the board and James H. Binger and Nicholas J. Covatta have been named to the board of directors of Lee Data Corp.

• Earl F. Wearstler, president of Diebold, Inc., was elected chief executive officer at the company's annual meeting.

• Dr. Robert S. Harp has resigned as chairman of the board and technical director of Vector Graphic, Inc. He will remain a member of the board.

• Edward M. Davis, president of the General Technology Division, has been elected a vice-president of IBM.

• Ralph Armstrong has been appointed vice-president, marketing, at Cardkey Systems, Inc. succeeding Mario Marinaccio who was recently promoted to vice-president/general manager, accessory group.

• George Beylouny has been appointed to the newly created position of vice-president of operations for Intelligent Systems Corp.

• Joseph F. Carbone Jr. has been named vice-president, operations, at Beehive International, Inc.

• Pete Craig has been promoted to vice-president of product marketing at Printronix, Inc.

• Ephraim Gitelman has been promoted to vice-president, operations, and Theodore L. Gendelman has been named vice-president, contracts, with Delta Data Systems Corp.

• C. Eric Giesa and Robert J. Bogle have been appointed vice-presidents at Sun Information Services Co.

• Harris Corp. has promoted six executives to the newly created position of senior vice-president. They are Paul S. Brentlinger, principal financial officer; Jack C. Davis, informations systems; John N. Lemasters, communications; Frank J. Lewis, government systems; Michael F. Maguire, semiconductors; James E. Pruitt Jr., printing equipment.

• Donald N. Rector has been named vice-president, sales, at Adaptec, Inc.

• Ernest R. Murillo has joined Franklin Electric, Inc.'s Programmed Power Division as vice-president of marketing.

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Contracts & Pacts

Norand Corp. has authorized RCA Service Co., a division of RCA Corp., to provide on-site maintenance and repair of the A-Line network system, the 400 series retail and pharmacy systems and the Norand NT490 and NT495 receiver systems, effective May 1.

Business Computer Systems Corp. (BCSC) has become a Burroughs Corp.-designated Independent Sales Organization (ISO) authorized to market Burroughs computer systems with BCSC application software to the retail industry in the U.S.

N.H. Marketing, Inc. has signed an agreement authorizing Burroughs Corp. sales people in the U.S. to assist in marketing N.H. Marketing software for use with Burroughs computers.

Texas Instruments, Inc. has signed an agreement giving Tisoft, Inc. the right to develop, produce, distribute and support SBC Basic and TPL 990 for TI's Business System 200 computers.

MDS Qantel, Inc. has signed a long-term agreement with the National Shoe Retailers Association (NSRA) to market exclusively the NSRA/Frame system to all NSRA members.

The Electronics Marketing Group of Wyle Laboratories, Inc. has been appointed distributor for Universal Data Systems, Inc. in the western sales region.

Graphics Technology Corp. has received orders from Advanced Control Technology, Process Equipment Co., Weldon Hydraulics, Inc., Nestler Systems AG Switzerland and Engineering Computer Services, UK. The company is also beginning production of a 60-Hz noninterlace color workstation.

Rockwell International Corp. and NCR Corp. have signed a microelectronic technology exchange agreement covering certain devices, including alternate source arrangements for selected Nmos and Cmos devices.

Cipher Data Products, Inc. has signed an agreement to supply Cromemco, Inc. of Mountain View, Calif., with Cipher's microstreamer ½-in. streaming tape drives. The value of the agreement was not disclosed.

General Instrument Corp.'s Government Systems Division received a $9.1 million contract from the U.S. Navy for its Airborne ESM System.

Ibis Systems, Inc. has received a contract from Cray Research, Inc. for the development and manufacture of a high-capacity memory disk drive with shipments to begin in early 1983. The value of the contract was not disclosed. Ibis has also signed an agreement with Amperif Corp. for the sale of Ibis 1250 disk drives for use with Amperif's cache disk system for IBM 30 series and 4300 computer systems.

Peripheral Marketing has signed OEM distribution and representative agreements with Siemens Corp., Brikon, Inc., Qubex Associates, Compower, Pertec Corp., Tecstor, Inc. and Western Peripherals.

Hewlett-Packard Co. has reached an agreement with Condor Computer Corp. to market the Condor Series 20 relational data base management system for the new HP 125 Business Assistant.

The Customer Service Division of TRW, Inc. and Televideo Systems, Inc. have signed a five-year agreement naming TRW as an exclusive national service representative for Televideo small business computer products.

MSI Data Corp. has reached an agreement to sell its portable handheld data entry computer terminals to General Electric Information Services Co., which will market the terminals to customers of its Mark III computer service network.

The Business Information Products Division of United Information Services, Inc. and Personnel Data Systems, Inc. (PDS) have begun the joint marketing of the PDS payroll/personnel software system.

Timberline Systems, Inc. has signed an agreement giving Tymshare, Inc. exclusive marketing rights to its line of software for the accounting market. Tymshare will also assume the customer services for all new and existing accountant users.

Information Magnetics Corp., a subsidiary of Computer and Communications Technology Corp., has signed a multimillion-dollar agreement with Storage Technology Corp. (STC) for the sale of Winchester disk recording heads. Under the terms of the agreement, STC will purchase a minimum of $18.5 million of products to be delivered in 1982 and 1983, with an anticipated total of $37 million through June 1984.

IBM has announced the appointment of Carterfone Communications Corp. of Dallas as an authorized distributor of selected IBM products including the company's Ascii terminals — the 3101 display terminal and 3232 Model 52 keyboard printer.

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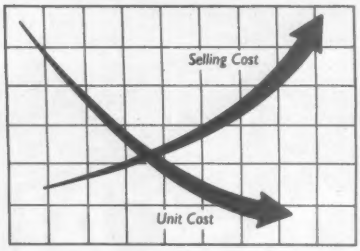

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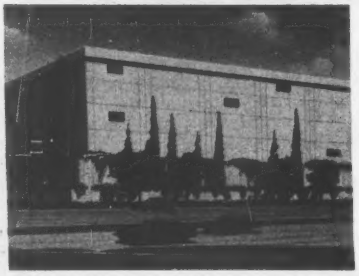

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PROGRAMMERS/PROGRAMMER ANALYSTS (Columbus & Canton, Ohio)
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CICS PROGRAMMERS

The successful candidates will be responsible for the development of on-line CICS programs in a variety of applications. A minimum of 2 years programming using COBOL, JCL and CICS command level required.

PROGRAMMER ANALYSTS

Responsibilities include definition of user specifications, documentation of system requirements, and test and development of programs in a manufacturing environment. In-depth knowledge of MAPICS required; at least 1 year experience on S/38 strongly preferred. RPG a must, COBOL a plus.

OPERATIONS MANAGER

The successful candidate will be involved in the start-up of three S/38's and will be responsible for operations management, staff supervision and user training, and will interface with manufacturing management and the division programming staff. Experience in both operations and programming required; knowledge of MAPICS utilizing a S/34 or S/38 in a manufacturing environment essential.

Hydril offers an excellent compensation/benefits program in a professional, growth oriented environment. Qualified applicants are encouraged to forward credentials to:

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A research and development division of a major U.S. corporation has an immediate need for a Software Development Engineer to help develop an advanced local digital switching system--a pioneering project that will bring involvement with the latest technology.

The job function consists of specification and design of software, using CHILL language for use in a custom designed distributed telephone switching system. The job also involves use of IBM software development tools, together with software production techniques in going from CHILL to executable load modules targeted for an INTEL 8086 16 bit processor. Extensive use is made of INTEL 8086 hardware and software development products including ICE 86. The individual will also be responsible for the definition of hardware/software trade-offs, and will interface with the hardware design engineers.

The person we seek must have a minimum of a Master's degree in Computer Science. In addition, this person must have a good working knowledge of the following: In-depth knowledge of telephone related hardware and software tools; working knowledge of CHILL and 8086 ASSEMBLER languages, together with software production techniques; IBM and INTEL software development tools.

Salary -- $29,000

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The academic computing services at Tulane University seeks to fill the newly-created position of User Services Programmer. Duties include installation and documentation of new academic software, new systems development, teaching of non-credit user-oriented short courses, and assisting student and faculty users of the academic DEC2060 computing system.

We require a minimum of a bachelor's degree and experience with Fortran and Basic. Experience with SPSS, BMDP, IMSL, and graphics on a large academic time-sharing system is very desirable.

Salary and benefits are competitive. The position is available immediately. Send resume and three letter of reference to:

Mr. Erving S. Pfau
Manager of User Services
Computer Laboratory
Tulane University
New Orleans, LA 70118

Resumes must be received no later than May 14, 1982.

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Systems Programmer Boulder, Colorado

To perform systems software development and maintenance on an IBM 4341 running under VM/SP and CMS that provides NCAR's computer users community with gateway and interactive access services.

POSITIONS REQUIRES: MS or equivalent experience in C.S., Engineering, Math, Physical Science and high level demonstrated skills in overall systems programming (about 6 to 8 years experience) including recent work maintaining and enhancing IBM 370 operating systems.

NCAR is an independent research institution operated by the nonprofit University Corporation for Atmospheric Research under sponsorship of the National Science Foundation. **Contact Margareta Domecki (303) 494-5151 or send resume to:**

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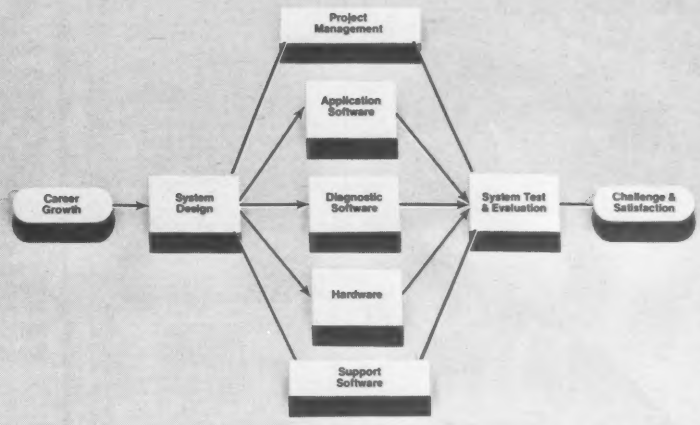

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Company offers an attractive salary,relocation,and fringe benefit package.

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*** programmer**
*** programmer analyst**

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Salary range $30,000 - $35,000 commensurate with experience and qualifications. Approximate starting date between June 15, 1982 to July 1, 1982. Submit resume to Peter J. Martel, Personnel Office, NSCC, 3 Essex Street, Beverly, MA 01915, no later than May 14, 1982.

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OFFICE OF THE GOVERNOR

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Applicants should also be capable of operating independently in defining, organizing and completing assignments.

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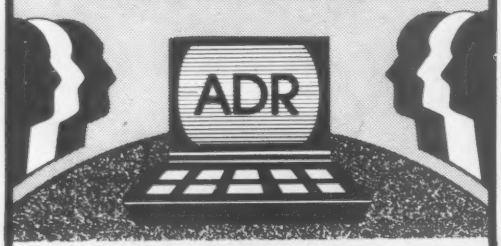
SOFTWARE DEVELOPMENT



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IBM SYSTEM PROGRAMMER

Georgia Tech has recently installed an IBM 4341 and has an immediate opening for a systems programmer experienced in installation, maintenance, and support of OS/MVS, JES2, TSO, CICS, and related IBM software. Salary to $29,500. B.S. degree and considerable experience required. Contact: **Ray Spalding, Manager, Systems Programming, Office of Computing Services, Georgia Institute of Technology, Atlanta, GA 30332. (404) 894-4660.** A unit of the University System of Georgia. *An Equal Opportunity employer.*

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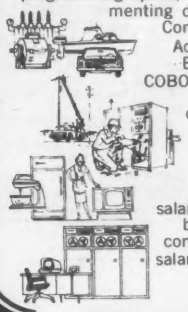

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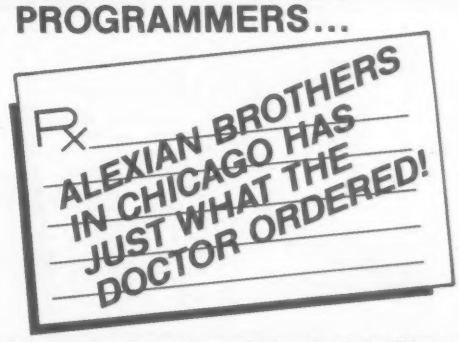

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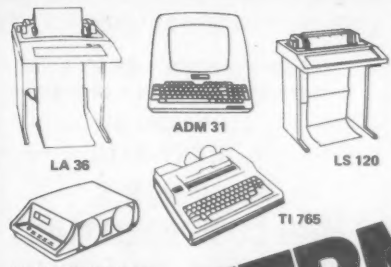

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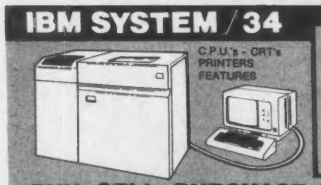

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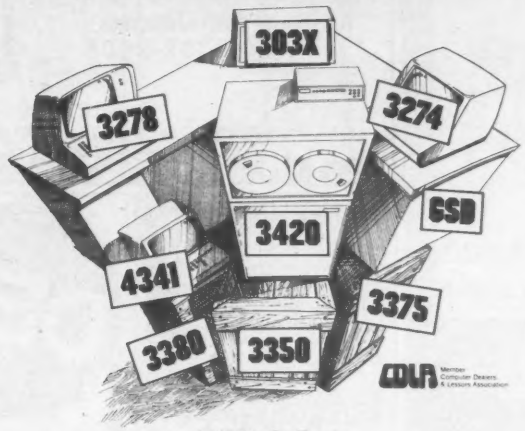

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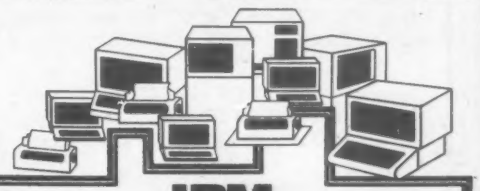

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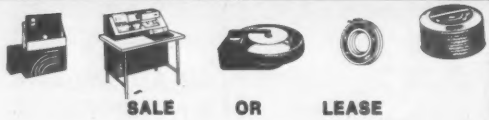

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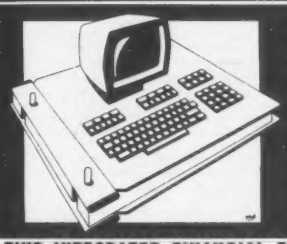

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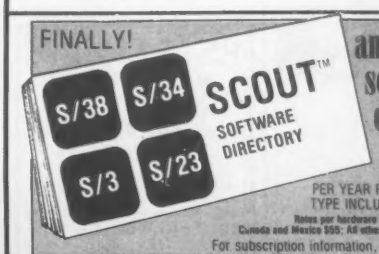

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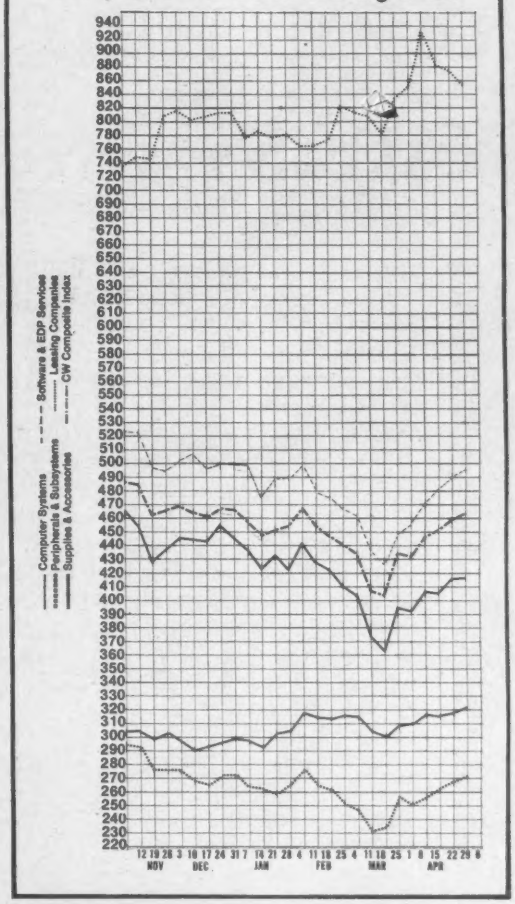

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Computerworld Stock Trading Summary

TRADE QUOTES

CLOSING PRICES WEDNESDAY, APRIL 28, 1982

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

EXCH		1981-82 RANGE (1)	CLOSE APR 28 1982	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	19- 46	21 1/8	+1 1/2	+7.6
N	BURROUGHS CORP	28- 72	36 1/2	+1 1/8	+3.1
O	COMPUTER AUTOMATION	6- 28	8 3/4	+ 1/2	+6.0
N	CONTROL DATA CORP	19- 42	30 1/2	+ 7/8	+2.9
N	CRAY RESEARCH INC	24- 48	25 5/8	-2 7/8	-10.0
N	DATA GENERAL CORP	27- 87	33 7/8	- 1/4	-0.7
N	DATAPOINT CORP	20- 68	21 3/4	0	0.0
N	DIGITAL EQUIPMENT	72-113	80 7/8	- 1/8	-0.1
A	EECO INC	6- 18	8 3/4	- 1/4	-2.7
N	ELECTRONIC ASSOC.	5- 13	7 7/8	+ 1/8	+1.6
N	FOXBORO	33- 82	37	+3 7/8	+11.6
O	FULCRUM COMP GRP	1- 3	1/4	0	0.0
O	GENERAL AUTOMATION	3- 16	5 1/8	+ 1/8	+2.5
N	HARRIS CORP	28- 60	31 1/2	- 1/8	-0.3
N	HEWLETT-PACKARD CO	33- 54	44 3/8	+ 5/8	+1.4
N	HONEYWELL INC	63-115	70 1/2	+2 1/2	+3.6
N	IBM	48- 73	64 7/8	+1	+1.5
O	IPL SYSTEMS INC	6- 13	6 3/4	- 1/4	-3.5
O	MAGNUSON COMP SYSTS	3- 32	3 7/8	- 3/4	-16.2
N	MANAGEMENT ASSIST	9- 26	16 3/8	+1 1/4	+8.2
O	MINI-COMPUTER SYST	0- 4	3/4	- 1/8	-14.2
N	MODULAR COMPUTER SYS	7- 32	7 3/8	- 1/4	-3.2
N	MOHAWK DATA SCI	10- 32	12 7/8	+ 1/8	+0.9
N	NCR	38- 78	48 3/4	+1 7/8	+4.0
N	PRIME COMPUTER INC	17- 48	22 5/8	+ 1/8	+0.5
N	PERKIN-ELMER	19- 38	22 7/8	+ 1/2	+2.2
N	SPERRY CORP	27- 65	28 1/2	- 3/8	-1.2
O	TANDEM COMPUTERS INC	13- 35	27 1/4	+ 1/4	+0.9
N	TEXAS INSTRUMENTS	71-151	90 1/2	+2	+2.2
A	WANG LABS.	22- 46	27 1/8	+ 7/8	+3.3
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	18- 29	23 3/4	- 1/2	-2.0
N	COMDISCO INC	16- 27	18 1/8	+ 5/8	+3.5
B	COMMERCE GROUP CORP	1- 2	3/8	0	0.0
O	COMPUTER INVSTRS GRP	1- 4	3/8	0	0.0
O	CONTINENTAL INFO SYS	4- 9	6 3/4	0	0.0
N	DPF INC	5- 13	9 3/8	- 1/8	-1.3
O	ITEL	1- 15	3/4	- 1/4	-25.0
O	LEASPAC CORP	1- 2	1/8	0	0.0
N	U.S. LEASING	18- 30	26 1/4	+ 7/8	+3.4

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH; B=BOSTON
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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(1) TO NEAREST DOLLAR

EXCH		1981-82 RANGE (1)	CLOSE APR 28 1982	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 6	1	- 1/2	-33.3
O	ADVANCED SYSTEMS INC	10- 15	13 3/4	- 1/2	-3.5
O	ANACOMP INC	10- 19	12 7/8	+ 3/8	+3.0
O	ANALYSTS INTL CORP	3- 14	7 1/4	- 1/4	-3.3
A	APPLIED DATA RES.	13- 25	22	+ 3/4	+3.5
B	ASTRADYNE COMP IND	2- 5	3 1/4	+ 1/8	+4.0
N	AUTOMATIC DATA PROC	22- 32	25 3/8	- 5/8	-2.4
O	CGA COMPUTER ASSOC	4- 25	6	- 1/4	-4.0
O	COMPUTER HORIZONS	1- 5	2 1/4	0	0.0
O	COMPUTER NETWORK	4- 9	6 3/8	+ 3/8	+6.2
N	COMPUTER SCIENCES	11- 30	12 1/4	+ 3/4	+6.5
O	COMPUTER TASK GROUP	10- 23	11 1/4	+ 1/2	+4.6
O	COMPUTER USAGE	2- 10	2 3/4	- 1/8	-4.3
O	COMSERV CORP	9- 16	13 3/4	0	0.0
O	COMSHARE	7- 21	8 5/8	- 3/8	-5.3
O	CULLINANE DATABASE	15- 37	31 3/8	+1 5/8	+5.4
O	DATA DIMENSIONS INC	0- 4	1/4	0	0.0
O	DATATAB	1- 4	1	0	0.0
O	DSI CORP	4- 9	5 3/4	- 1/4	-4.1
O	DYATRON CORP	2- 11	2 3/4	+ 1/2	+22.2
N	ELECTRONIC DATA SYST	15- 30	26 5/8	0	0.0
O	INFORMATICS INC	10- 23	18 1/2	+ 1/2	+2.6
O	INSYTE CORP	1- 3	2 3/8	0	0.0
O	IPS COMPUTER MARKET.	1- 4	1 1/8	0	0.0
O	KEANE ASSOCIATES	4- 8	5	+ 1/4	+5.2
A	LOGICON	12- 30	13 3/8	- 1/2	-3.6
O	MNGT SCI AMER INC	17- 28	22 3/4	+ 1/2	+2.2
O	MATHEMATICA INC	12- 28	17 1/2	+1 1/2	+9.3
O	MATHEMATICAL APP GRP	14- 28	18	+2	+12.5
O	NATIONAL DATA CORP	14- 28	18 1/8	0	0.0
N	PLANNING RESEARCH	5- 13	7 3/8	+ 3/8	+5.3
O	PROGRAMMING & SYS	1- 2	1 3/8	- 1/8	-7.9
O	REYNOLDS & REYNOLD	16- 26	21	+1 1/2	+7.6
O	SEI CORP	17- 28	27 1/2	+2 1/4	+8.9
O	SHARED MEDICAL SYST	28- 37	30 5/8	+ 1/2	+1.6
O	STSC INC	6- 28	7 1/4	0	0.0
O	SCIENTIFIC COMPUTERS	6- 18	8 1/2	0	0.0
O	SOFTWARE AG	7- 23	8 1/4	+ 1/8	+1.3
N	TYMSHARE INC	18- 38	20 1/8	+ 1/2	+2.5
A	URS CORP	11- 18	11 3/4	0	0.0
N	WYLY CORP	7- 20	8 1/4	- 1/8	-1.4
	PERIPHERALS & SUBSYSTEMS				
N	AM INTERNATIONAL	1- 25	1 1/8	- 1/8	-10.0
A	ANDERSON JACOBSON	8- 28	10 1/2	+ 1/8	+1.2
O	AUTO-TROL TECHNOLOGY	8- 62	10 1/4	+1 1/2	+17.1
O	BANCTEC INC	13- 35	13 3/4	0	0.0
O	BEEHIVE INT'L	6- 18	8 7/8	+ 1/8	+1.8
A	BOLT,BERANEK & NEW	8- 25	18	-1 1/2	-7.6
O	CAMBEX CORP	2- 9	2 5/8	- 3/8	-12.5
N	CENTRONICS DATA COMP	7- 40	11 1/4	+ 3/8	+3.4
A	CETEC CORP	4- 9	4 1/8	0	0.0
O	COMPUTER DEVICES INC	4- 10	8 1/8	0	0.0
O	COGNITRONICS	2- 11	4 1/2	+ 3/8	+9.0
O	COMPUTER COMMUN.	1- 2	7/8	0	0.0

EXCH		1981-82 RANGE (1)	CLOSE APR 28 1982	WEEK NET CHNGE	WEEK PCT CHNGE
A	COMPUTER CONSOLES	16- 28	25 1/8	+ 1/8	+0.5
O	COMPUTER TRANSCEIVER	3- 9	5 7/8	+ 3/8	+6.8
N	COMPUTERVISION CORP	20- 49	33 1/8	+1 7/8	+6.0
N	CONRAC CORP	17- 28	25 1/4	-1 1/8	-4.2
A	DATA ACCESS SYSTEMS	2- 23	1 7/8	- 3/4	-28.5
A	DATAPRODUCTS CORP	17- 44	23 1/4	+ 1/8	+0.5
O	DATUM INC	2- 5	1 1/2	0	0.0
O	DAVID JAMISON CARLYL	3- 17	4 3/4	+ 1/2	+11.7
O	DECISION DATA COMPUT	3- 6	3 1/2	+ 1/4	+7.6
O	DELTA DATA SYSTEMS	2- 4	1 3/4	+ 1/8	+7.6
O	DATARAM CORP	4- 15	7 5/8	0	0.0
N	ELECTRONIC M & M	3- 9	4	- 1/8	-3.0
O	EVANS & SUTHERLAND	18- 40	21 3/4	-2 3/4	-11.2
O	GENERAL COMPUTER SYS	1- 12	5 1/4	+1 1/4	+31.2
N	GEN'L DATA COMM IND	7- 19	9	0	0.0
O	GENERAL TERMINAL CP	0- 4	3/8	0	0.0
N	HAZELTINE CORP	19- 35	30 1/4	- 3/8	-1.2
O	INFORMATION INTL INC	8- 17	11 1/4	0	0.0
O	INTEL CORP	21- 51	32	+1	+3.2
O	IPL SYSTEMS INC	5- 15	6 3/4	- 1/4	-3.5
A	LUNDY ELECTRONICS	7- 18	10 1/8	+ 3/4	+8.0
A	MSI DATA CORP	11- 27	20	+1 3/4	+9.5
O	NETWORK SYSTEMS CORP	14- 25	19 5/8	- 3/8	-1.8
O	OMEX	5- 8	3	0	0.0
N	PARADYNE CORP	25- 52	40	+2 1/2	+6.6
A	PENRIL CORP	7- 17	9	+ 1/8	+1.4
O	RAMTEK CORP	9- 23	17 1/4	+1 1/4	+7.8
N	RECOGNITION EQUIP	4- 21	4 7/8	0	0.0
O	SCAN DATA	1- 5	1 1/4	+ 1/8	+11.1
N	STORAGE TECHNOLOGY	18- 40	25 7/8	+ 1/8	+0.4
O	SYKES DATATRONICS	8- 36	15 3/4	- 1/4	-1.5
A	T BAR INC	12- 19	14 7/8	+ 3/4	+5.3
A	TEC INC	4- 11	8 3/8	- 3/8	-4.2
N	TEKTRONIX INC	83- 70	55 1/8	- 1/8	-0.2
N	TELEX	5- 9	9	0	0.0
O	TESDATA SYSTEMS CP	4- 17	9 3/8	0	0.0
A	TIMEPLEX INC	7- 18	9 3/8	- 5/8	-6.2
O	WILTEK INC	1- 3	1 1/2	0	0.0
	SUPPLIES & ACCESSORIES				
N	AMERICAN BUS PRODS	11- 17	12	+ 1/4	+2.1
O	BALTIMORE BUS FORMS	1- 2	1 1/4	0	0.0
N	BARRY WRIGHT	15- 24	16 1/2	- 1/2	-2.9
O	CYBERMATICS INC	1- 2	1	0	0.0
A	DUPLEX PRODUCTS INC	12- 17	14 3/8	+ 5/8	+4.5
N	ENNIS BUS. FORMS	15- 23	19 1/2	+1	+5.4
N	3M COMPANY	48- 85	55 5/8	- 3/8	-0.6
O	MOORE CORP LTD	27- 38	31 1/4	+ 3/8	+1.2
N	NASHUA CORP	16- 33	17 5/8	- 1/2	-2.7
O	STANDARD REGISTER	30- 41	38 1/4	+ 1/2	+1.3
A	TAB PRODUCTS CO	14- 30	15 1/2	+ 1/8	+0.8
N	WALLACE BUS FORMS	22- 36	31 1/4	+ 3/4	+2.4

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